Intercomparison of ecological potential for Lakes and Reservoirs

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List of Abbreviations

AWB	Artificial water body
BQE	Biological quality element
CIS	Common Implementation Strategy
GEP	Good ecological potential
GES	Good ecological status
HMWB	Heavily modified water body
Hymo	Hydromorphology or Hydromorphological
MEP	Maximum ecological potential
RBD	River Basin District
RBMP	River basin management plan
SAEOU	Significant adverse effect on use(s)
SQE	Supporting quality element
QE	Quality element

Member states and other countries

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
TR	Turkey

1 Introduction

1.1 Background

CIS Guidance no. 37 (December 2019) proposed a common methodological framework for defining and assessing the good ecological potential (GEP) of heavily modified water bodies (HMWB) in all water categories, as a mechanism for improving compliance and consistency and assisting comparability of approaches between Member States.

The flow-chart below (Figure 1) presents the stepwise framework of CIS Guidance no. 37 and shows two routes or approaches to follow this framework (the reference approach and the mitigation measure approach). Both approaches (two different routes in the stepwise framework) are acceptable and should lead to the same outcomes (ecological condition), provided there is good knowledge available on the links and interactions between biology, hydromorphology and mitigation effects from relevant measures. The process described in the flow-chart is relevant to all water categories (rivers, lakes, transitional and coastal waters) and closest comparable water body types.

The Guidance is accompanied by a European 'library' of emerging good practice mitigation measures for HMWB which was set up for the purpose of supporting the new Guidance.

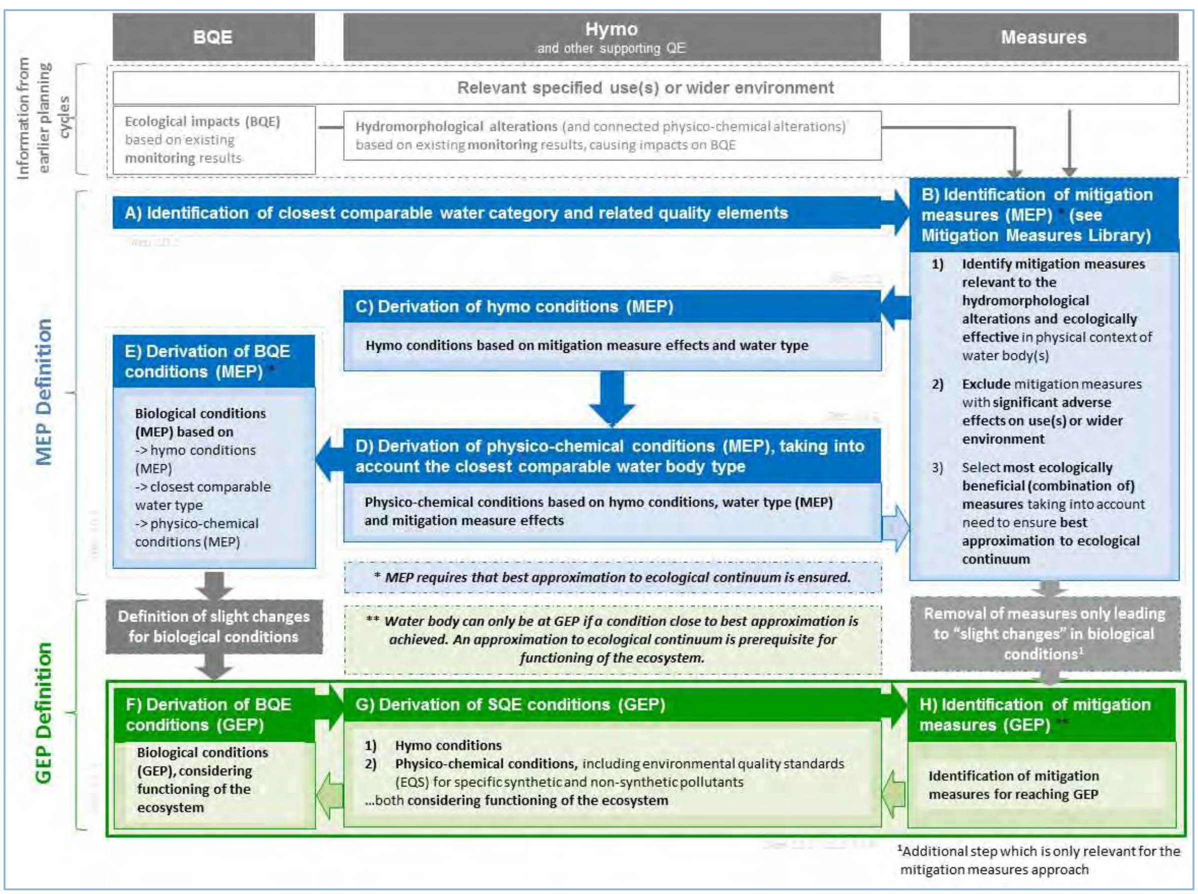

Figure 1 Process with key steps for defining MEP and GEP showing comparability between the two approaches (reference approach and mitigation measures approach)

Notes: The complete stepwise approach anticipates that Member States have enough information and knowledge (Biological Quality Element, hydromorphological and physico-chemical data, mitigation measures library, ability to predict the effects of measures) to be able to follow the reference approach as set out in the WFD. In this case, all steps have to be followed to be in line with WFD requirements (route A→B→C→D→E→F→G→H).

As an alternative to the reference approach, Member States can use the mitigation measures approach. Such an approach is suggested in case it is not yet possible to predict the Maximum Ecological Potential (MEP) conditions for the BQEs due to a lack of knowledge or data. Under the mitigation measures approach, for the steps referring to MEP definition, Member States should still follow steps A and B and should also go through steps C and D, insofar as the availability of information on hydromorphology and physico-chemical elements allows. Step D then feeds back into step B and the process continues from step B to step H and step G. The mitigation measures approach assumes then that the conditions for physico-chemical and biological elements for GEP are those deriving from the implementation of measures defined in step H. In summary, the route to be usually followed through the flow-chart, when applying the mitigation measures approach is A→B[→C→D→B]→H→G(→F).

1.2 Aims of the intercomparison

The requirement for intercalibration of HMWB (WFD Annex V 1.4.1) implies that there is a need to ensure GEP classification methods comply with the WFD, and that classification results are comparable between Member States (MS). Back in 2011 a concept paper on Intercalibration of GEP[1] was endorsed by the Water Directors, discussing possibilities to fulfil the WFD legal requirement for intercalibrating ecological potential and providing recommendations on assessing and improving comparability of ecological potential assessments. As a result, it was agreed that a process called "intercomparison" would be put in place to compare approaches for setting GEP in Member States, considering that the "intercalibration" of GEP as defined by the WFD and as performed for natural water bodies was not considered as feasible for HMWB at that time.

Section 7 of the Guidance no. 37 outlined the objectives of the intercomparison of ecological potential. The purpose is to describe and compare the national methods used to establish maximum and good ecological potential (MEP and GEP) on the basis of the requirements of the WFD. The comparability of MS approaches will be facilitated by a review procedure which will be undertaken by the GEP core group of ECOSTAT. This will identify good practices, support good implementation of the WFD requirements regarding GEP, recognise progress through comparable approaches and identify differences in interpretation/implementation leading to a lack of comparability.

For this purpose, in 2020, the GEP core group of ECOSTAT supported by a team of consultants developed three distinct questionnaires (on the water categories Rivers, Lakes/Reservoirs and TraC) for the intercomparison of ecological potential with the following aims:

1. Firstly, collect information on the methods for definition and assessment of ecological potential used in the MS for the 3rd river basin management plans (RBMPs), as a basis for understanding the different approaches used, and
2. Secondly, compare approaches for definition and assessment of ecological potential, which are relatively well-developed and to some extent comparable to the stepwise approach described in CIS Guidance no. 37.

Therefore, the intercomparison exercise is of value to all MS despite varying degrees of progress in the development of methods for ecological potential definition and assessment. The intercomparison will allow exchange of knowledge and methodological developments between countries and thus support them in WFD implementation. It will also indicate progress in ecological potential definition and assessment according to the principles set in the WFD as well as remaining gaps and differences in interpretation.

1.3 Purpose and scope of the report

This report presents the results of the intercomparison of methods for defining and assessing ecological potential in the water category of Lakes and Reservoirs as heavily modified water bodies. Heavily modified lakes were natural lakes before their modification as well as, in some cases, coastal waters which were dammed and separated from the sea. Reservoirs were previously rivers that have been transformed into reservoirs due to the construction of a dam and now resemble a lake water category.

[1] https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/32886957-730f-4aea-a603-f763f391ab27/details

The report presents and summarises the information provided by countries on the steps of the Guidance no. 37 definition procedure for ecological potential, which they use for the 3rd RBMPs and how they interpret and apply the steps in practice.

On the basis of the methodological information in the country questionnaires, the report aims at the following:

- To identify the steps of the Guidance no. 37 definition procedure which can be applied in the majority of countries and those which are only applied in few countries.
- To identify commonalities and differences between MS in the interpretation and implementation of the various steps, supporting the identification of comparable or non-comparable approaches. In this context, the report discusses the extent to which MS implement the WFD requirements according to Guidance no. 37 and how, to the extent that the available information allows to do so. In this context, we focus more on the process (whether or not MS have been able to address relevant steps and aspects) rather than on specific outcomes in the specific HMWB examples and case studies.
- To present examples of the country approaches and methods.
- To identify the main gaps, unclear issues and challenges faced by the MS. This includes the identification of steps that cannot be followed by a majority of MS and a description of relevant justifications provided.
- To provide recommendations on the main aspects on which MS need to take action and the main aspects where further information provision, discussion and guidance development at the level of ECOSTAT is needed.

1.4 Structure of report

Chapter 2 introduces and briefly describes the questionnaire on the intercomparison of ecological potential for lakes that countries filled in in autumn 2020. It also gives an overview of countries that returned the questionnaire with information on their approaches and methods for ecological potential definition.

Chapter 3 introduces in brief the HMWB examples/case studies which countries referred to when providing their responses on their methods in the questionnaires.

Chapter 4 gives a first overview of all methods reported, indicating which overall approach is used (reference approach, or mitigation measures approach, or combination), the status of development of the methods and the overview of steps which countries reported to have equivalents on.

Chapter 5 presents the main findings from the filled-in questionnaires on the pre-step of designation of HMWB.

Chapter 6 presents the main findings from the filled-in questionnaires on the different steps comprising the definition of MEP (identification of closest comparable water category, identification of mitigation measures excluding those with significant adverse effects on use or environment), derivation of hydromorphological, physicochemical and biological conditions for MEP (steps A, B, C, D, E).

Chapter 7 presents the main findings from the filled-in questionnaires on the different steps comprising the definition of GEP (derivation of biological and supporting element conditions, identification of mitigation measures for GEP) (steps F, G, H).

Chapter 8 presents the main findings from the filled-in questionnaires on the steps comprising the implementation of measures to achieve GEP (steps monitoring to assess if GEP is being achieved and decide if further measures need to be implemented; assessment of disproportionate expensive or infeasible GEP measures; implementation of GEP measures and monitoring their effects).

Chapter 9 summarises some of the main lessons learned on strengths and weaknesses of methods to define ecological potential currently in use, as indicated by countries themselves.

The concluding chapter 10 summarises key conclusions on country methods and the extent to which they cover the steps of the procedure laid out in Guidance no. 37, based on the information provided in the filled-in questionnaires.

Annex 1 lists the references and links to sources provided by the countries. Annex 2 provides the original (empty) questionnaire.

There are also two separate documents as Appendices to the report. Appendix 1 presents all the original responses given by countries in their questionnaire. Each step of the main report has an equivalent section in Appendix 1. Appendix 2 presents the case studies used by several Member States to respond to the questionnaire.

Note on tables illustrated in report (main part and in the Appendix):

Tables in the report only include information on countries that provided a response on a particular aspect of the questionnaire. Countries that have not responded to the questionnaire or have not provided step-specific information using a selected HMWB example are not listed in the various tables of the report.

It is also noted that all information in the report on the methods for ecological potential definition is related to the status of the methods as of autumn 2020 (submission of intercomparison questionnaires). The status of the methods could not be fully reflected in the report for countries that did not provide a case study to illustrate their method (despite having methods in place). We are aware that at the time of publication, methods have been updated for certain countries, however a full overview of methods' updates is not possible to be presented.

Disclaimer:

It is acknowledged that some questionnaire responses may have become outdated since the time of filling in the questionnaires, e.g. responses concerning the selection of measures for particular case studies which may have changed during the development of the river basin management plans.

2 Questionnaire on intercomparison of ecological potential

2.1 Scope of questionnaire

The questionnaire on the intercomparison of ecological potential of HMWB for Lakes and Reservoirs was circulated as an Excel document to ECOSTAT in September 2020 and responses were collected between November 2020 and February 2021.

All countries which designated and classified HMWB lakes or reservoirs in the 3rd RBMP cycle were requested to fill in this intercomparison questionnaire. The countries were instructed to fill in the questionnaire with reference to the **methodologies** which they apply for ecological potential definition and assessment **in preparation of their 3rd RBMPs.**

Like for rivers, the questionnaire for lakes and reservoirs was designed in a way to allow all countries to respond, taking into account the fact that some countries have less developed methods than others. Responding to the questionnaire did not necessarily involve responding to all questions. This depended on the degree to which the method corresponded to the different steps of the CIS Guidance no. 37.

Use of classified HMWB to illustrate methods for definition and assessment of ecological potential:

The questionnaire provided a common template to provide clear explanations of the methods used for ecological potential definition and assessment in the 3rd RBMPs, using selected HMWB examples (case studies) to better illustrate the different steps.

The selected examples should be HMWB that have been classified but they do not have to be fully developed ideal case studies on the definition and assessment of ecological potential. For countries with less developed methods for the 3rd RBMPs, the selected HMWB examples can be HMWB which have been classified using another preliminary approach. In any case, the examples provided are assumed to reflect the most common methodology within a country, although other methods might additionally be in place.

If a country has only recently developed a new method which will soon be applied though for classifying HMWB in the 3rd RBMPs, it was possible to illustrate the method using information from an early application or partial application of the method on a selected HMWB example. If a new method is in early stages of development (e.g. application in test cases not started yet) and it is not planned to use it in the 3rd RBMPs, the questionnaire should have been filled with reference to the method used for classifying the HMWB in the 3rd RBMPs.

Countries were also advised to choose HMWB examples that are affected by at least one of the most common physical modifications identified for HMWB lakes/reservoirs across Europe. The identification of the most common physical modifications based on an earlier ECOSTAT activity in spring 2020 is described in section 5 Pre-step. Designation of HMWB & information from earlier planning cycles.

Disclaimer on lakes and reservoirs

When a water body has been designated as a HMWB, it must be given the closest comparable water category. When countries choose which intercomparison questionnaire to fill in, they were advised to do so on the basis of the water category of the water body as a HMWB, not on the basis of the category it would have if it were to be seen as a natural water body. For example, if the existing modifications to a river make it more closely resemble a lake (e.g. a large reservoir that shows typical lake ecosystem conditions like a stratification), the water body should be handled as a lake within this Lakes/Reservoirs intercomparison questionnaire. If a modified river is clearly a river ecosystem, although it is altered by storage through a dam (e.g. a large river with impoundments and a reduced flow velocity), this should be handled as a river within the Rivers intercomparison questionnaire. For cases that are somewhere in between riverine and lake ecosystem conditions (e.g. a small reservoir with a residence time of two days, a continuous flow and riverine habitat conditions), countries were asked to decide whether to handle those as rivers or lakes within the relevant intercomparison questionnaire and to provide an explanation of their decision.

For the purpose of this report, we assume that all HMWB examples (case studies) provided as examples of reservoirs are water bodies that, after their modification, more closely resemble a lake.

2.2 Structure of the intercomparison questionnaire

The questionnaire on the intercomparison of ecological potential of HMWB for Lakes and Reservoirs is designed like the questionnaire for Rivers and includes 18 sections in an Excel spreadsheet (with approximately 150 distinct questions). The types of questions are a combination of close-ended questions (i.e., with predefined answers) and open-ended questions (i.e., as free text description).

The following are the main blocks of the questionnaire:

- **Section 1** (General information on method used for definition and assessment of ecological potential) which should be filled in by all countries which have designated HMWB in the specific water category.
- **Section 2** (Description of method in open format) which should be filled in by countries whose method does not include any step equivalent to CIS Guidance Document no. 37.
- **Sections 3 and 4** (on the context and designation of the HMWB example) which should be filled in by countries whose method for ecological potential definition and assessment has one or more steps equivalent to the steps described in the CIS Guidance Document no. 37 and which could provide a HMWB example.
- **Sections 5 to 17** (on each step of the ecological potential definition procedure) which should be filled in by countries whose method for ecological potential definition and assessment has one or more steps equivalent to the steps described in the CIS Guidance Document no. 37 and which could provide a HMWB example.

  Sections 5 to 17 of the intercomparison questionnaire were developed, following the structure of the steps proposed for defining and assessing ecological potential in CIS Guidance Document no. 37.
- **Section 18** (Lessons learned) to be filled in by all countries.

The empty form of the questionnaire on the intercomparison of ecological potential of HMWB for Lakes/Reservoirs is provided in Annex 2.

Overview of questionnaire sections

1	General information on method used for GEP definition
2	Description of method in case of no equivalent steps to CIS 37
3	Description of HMWB selected for this questionnaire
4	Pre-step. Designation of HMWB & information from earlier planning cycles
5	Step A. Identification of closest comparable water category
6	Step B1. Identify mitigation measures relevant to each of the hydromorphological alterations and ecologically effective in the physical context of the water body
7	Step B2. Exclude mitigation measures with significant adverse effect on use or wider environment
8	Step B3. Select most ecologically beneficial (combination of) measures taking into account need to ensure best approximation to ecological continuum
9	Step C. Derivation of hydromorphological conditions for MEP

10	Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type
11	Step E. Derivation of BQE conditions for MEP
12	Step F. Derivation of BQE conditions for GEP
13	Step G. Derivation of supporting quality element conditions for GEP
14	Step H. Identification of mitigation measures for GEP
15	Monitoring to assess whether GEP is being achieved
16	Are there GEP measures that are disproportionally expensive or infeasible?
17	Implement GEP measures and monitor effects on BQEs and supporting quality elements
18	Lessons learned & further developments

2.3 Responses from European countries

A total of 19 countries filled in and returned the intercomparison questionnaire of ecological potential of HMWB for Lakes/Reservoirs (Table 1 dark grey fields).

Two countries (BG, IS) submitted a questionnaire but with very limited information in section 1 stating that the method was under development or in an early stage of development. One country (DK) stated in the questionnaire that there were no lakes classified as HMWB in the country at all and therefore no methodology had been developed. Four countries (EE, IE, LU, TR) responded and provided a brief explanation why no questionnaire was submitted, primarily due to a lack of method or early stage of development and without providing any further methodological details (Table 1 light grey fields).

Four EU Member States (BE, MT, SI, SK) did not respond to the Lakes/Reservoirs questionnaire at all or did not send an explanation why no questionnaire was provided (Table 1 white fields).

Table 1 provides an overview with countries in alphabetical order. In the detailed analysis of methods presented in this report, only the 19 countries with complete intercomparison questionnaires are considered. As explained in section 3, the majority (16) of the countries could fill in the questionnaire with reference to a specific HMWB example/case study to illustrate the application of their methods. Among the countries which submitted a complete questionnaire, three (DE, IT, PT) did not provide a case study.

Five countries selected a heavily modified *lake* water body, while ten countries selected a *river* that changed its character to the category 'lake' and became a reservoir. One country (NL) provided a case study with a coastal water which became a HMWB lake.

Table 1 Overview of submitted questionnaires

	Status of submission	Notes	Questionnaire filled in with reference to specific HMWB example/case
AT	Submitted		Yes, example/case study provided (lake HMWB)
BE	Not submitted		
BG	(Responded/submitted)	Only brief information in section 1 of questionnaire	

	Status of submission	Notes	Questionnaire filled in with reference to specific HMWB example/case
CY	Submitted	No method developed for lakes.[2] Reservoirs were part of the intercalibration phase 1 and 2 and are included in the EU Decision in intercalibration results (only phytoplankton)[3]	Yes, example/case study provided (river → reservoir)
CZ	Submitted		Yes, example/case study provided (river → reservoir)
DE	Submitted		No example/case study provided
DK	(Responded/submitted)	DK has no lakes classified as HMWB and therefore no methodology for defining or assessing ecological potential for the water category Lake	
EE	Responded but not submitted	The three reservoirs are part of river water bodies (designated as HMWB). Thus the questionnaire not relevant for lakes in Estonia.	
EL	Submitted		Yes, example/case study provided (river → reservoir)
ES	Submitted		Yes, example/case study provided (lake HMWB)
FI	Submitted		Yes, example/case study provided (lake HMWB)
FR	Submitted		Yes, example/case study provided (river → reservoir)
HR	Submitted		Yes, example/case study provided (river → reservoir)
HU	Submitted		Yes, example/case study provided (river → reservoir)
IE	Responded but not submitted	Currently drafting 3rd RBMPs and would hope to have updated case studies in the future,	

[2] CY: Lakes — we have not developed methods for GEP. In fact, due to our peculiar lakes we are still collecting data to develop methods to assess ecological status. Cyprus has only seven natural lakes. All these lakes are temporary brackish lakes or temporary salt lakes and they belong to four different types; two out of the seven are HMWB. It is very difficult to apply WFD BQEs in these systems due to natural factors having a huge impact on the biota (periods when lakes are dry, high fluctuations of salinity, etc.).
[3] CY: *Water Reservoirs* — We had participated in the 1st and 2nd IC exercise of the Med Lake GIG, where GEP was determined for phytoplankton based on data from reservoirs in reference conditions and in impacted conditions. This was done in a joint exercise with the other Mediterranean countries and we also adopted the index that was developed in this exercise (New Mediterranean Assessment System for Reservoirs, NMASRP).

	Status of submission	Notes	Questionnaire filled in with reference to specific HMWB example/case
		but not in time for the current questionnaire	
IS	(Responded/submitted)	Only brief information in section 1 of questionnaire	
IT	Submitted		No example/case study provided
LT	Submitted		Yes, example/case study provided (river → reservoir)
LU	Responded but not submitted	Explanation provided (no natural lakes, only 2 reservoirs; individual approach applied)	
LV	Submitted		Yes, example/case study provided (river → reservoir)
MT	Not submitted		
NL	Submitted		Yes, example/case study provided (coastal water → lake)
NO	Submitted		Yes, example/case study provided (lake HMWB)
PL	Submitted		Yes, example/case study provided (lake HMWB)
PT	Submitted		No example/case study provided
RO	Submitted		Yes, example/case study provided (river → reservoir)
SE	Submitted		Yes, example/case study provided (river → reservoir)
SI	Not submitted		
SK	Not submitted	No delineations were reported, but it is unclear if this refers to both HMWB lakes and reservoirs.	
TR	Responded but not submitted	Not possible to respond due to lack of data and incomplete methodologies. The method for ecological potential definition and assessment for rivers and lakes/reservoirs has been under development in TR. Likewise, development methodology of HMWB is in the early stage.	
Sum	**19 questionnaires**	**+ 7 responses**	**16 HMWB examples**

3 Examples/case studies on intercomparison of ecological potential for lakes

As explained in section 2.1, the ecological potential intercomparison questionnaire was mainly filled in with reference to a specific classified lake or reservoir HMWB example from each country. This should help to better illustrate how the different steps of the procedure for defining ecological potential are applied in practice using the relevant national methods.

The majority of countries (16) was able to contribute a HMWB example/case study to illustrate the application of their methods. Six countries selected a heavily modified *lake* water body, while ten countries selected a *river* that changed its character to the category 'lake' and became a reservoir. Apart from the six countries without any (developed) method at all, three countries could not illustrate their method by means of a specific HMWB example.

Table 2 Overview of countries that have / have not provided a HMWB case study

Countries with a HMWB case study		Countries without a HMWB case study	
Lake HMWB	River HMWB	Method available but no case study provided	No method, method under development, or no lakes/reservoirs at all
AT, ES, FI, NL, NO, PL	CY, CZ, EL, FR, HR, HU, LT, LV, RO, SE	DE, IT, PT	BG, DK, EE, IS, LU, TR
Total number: 16		Total number: 9	

The following table gives a brief overview description of the HMWB examples used in the intercomparison questionnaires with reference to the main uses, physical modifications, key lake characteristics and ecological status/potential classification.

A detailed overview of the main physical alterations and water uses for which the selected HMWB examples were designated for is given in the next section 5 of this report. In Appendix 2 (separate document), detailed information is given on the HMWB examples including simple sketches or maps of the case studies, as provided by country experts.

Table 3 Overview description of the HMWB case studies.

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
AT Lake Achensee 3500300	Main use: hydropower Main physical modification: reservoir operation (hydropower), shore fixation or modification, changed residence time, weir or other structure with lake water level regulation Adversely affected physico-chemical elements (at least moderate): temperature	No change of category Lake type: Alpine lake above 800 m asl, surface area 6.8 km², max. depth >50 m Within natural fish zone; tributaries and outflow: Epirhithral, no migratory fish	Poor ecological status (based on macrophytes) Good ecological potential *No protected area*

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
CY Polemidia Reservoir CY_9-4-d_RI_HM_IR	Main use: irrigation Main physical modification: reservoir operation (other), abstractions, dam/embankments with raised lake water level Adversely affected physico-chemical elements (at least moderate): transparency, temperature, oxygen; nutrients, specific pollutants	Category changed from river to lake Former river: <800 m asl Reservoir: surface area 0.16 km^2, estimated residence time 6-12 months Outside natural fish zone	Bad ecological status Below good ecological potential *UWWTD Sensitive Area*
CZ Věstonice Reservoir DYJ_1195_J	Main use: flood protection Main physical modification: shore fixation or modification, dam/embankments with raised lake water level, changed residence time Adversely affected physico-chemical elements (at least moderate): transparency, temperature, oxygen	Category changed from river to lake Nové Mlýny reservoirs: 3 SWB, the middle selected as case study Former river: lowland, medium-size epipotamal Reservoir: surface area >10 km^2, mean depth <5 m, residence time <1 month Within natural fish zone, fish spawning in tributaries	Unknown, but original riverine community was replaced by species inhabiting lake habitats; all BQE affected by physical modifications Poor ecological potential *Natura 2000*
EL Techniti Limni Marathona WB1	Main use: water supply Main physical modification: reservoir operation (other), abstractions Adversely affected physico-chemical elements (at least moderate): transparency, temperature, nutrients, oxygen	Category changed from river to lake Former rivers: mid-altitude, calcareous, R-M1 and R-M5 (today tributaries) Reservoir: surface area 0.5–5 km^2, mean depth >10 m, residence time 6-12 months (in some years 1 year) Within natural fish zone after introductions, after 90 years the 90 years ago, the fish populations may be considered naturalized; tributaries metarhithral based on the size and dynamics	Below good ecological status (due to changes in several BQE) High status (based on phytoplankton using lake classification method) At least good ecological potential *WFD protected area designated for the abstraction of water intended for human consumption under Article 7*

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
ES Laguna de la Nava de Fuentes ES020MSPF000101110	Main use: irrigation, recreation Main physical modification: abstractions, dam/embankments with raised lake water level, weirs or other structure with lake water level regulation Adversely affected physico-chemical elements (at least moderate): –	No change of category Lake: mid-altitude, surface area 3,26 km², mean depth 5 m No information on natural fish zone	Moderate ecological status (major impact on macrophytes) Moderate ecological potential *Site of Community Importance (SCI), Special Protection Area, Wetland*
FI Lake Kemijärvi WB1	Main use: hydropower Main physical modification: reservoir operation (hydropower, other), shore fixation or modification, dams/embankments with raised lake water level, changed residence time Adversely affected physico-chemical elements (at least moderate): temperature	No change of category Lake: lowland, organic, catchment >1,000 km², surface area 230 km², mean depth 5.3 m, stratified Within natural fish zone, diadromous and potamodromous species	Moderate ecological status (based on invertebrates, other BQE good) Good ecological potential *Several Natura 2000 nearby*
FR Serre-Ponçon lake FRDL95	Main use: hydropower, flood protection, irrigation, water supply Main physical modification: reservoir operation (hydropower, other) Adversely affected physico-chemical elements (at least moderate): transparency, temperature, oxygen, specific pollutants	Category changed from river to lake Former rivers: mid-altitude, calcareous, catchment >1,000 km² Reservoir: 779 m asl, surface area 27.45 km², mean depth 37.5 m, residence time ca. 6 months Within natural fish zone, tributaries epirhithral, diadromous and potamodromous species	Poor ecological status (based on all BQE except phytoplankton) Good ecological potential *Neighbouring SWB in Natura 2000*
HR Pakra Reservoir CSLN010	Main use: flood protection Main physical modification: reservoir operation (other), shore fixation or modification, dam/embankments with raised lake water level, weir or other structure with lake water level regulation Adversely affected physico-chemical elements (at least	Category changed from river to lake 1 SWB + 3 adjacent SWB (supply channel HMWB, 2 natural rivers) Former river: lowland, medium-sized Reservoir: surface area 2.73 km², mean	Bad ecological status (based on macroinvertebrates) Moderate ecological potential *Natura 2000*

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
	moderate): temperature, oxygen; nutrients, transparency	depth 2.7 m, residence time <1 month Within natural fish zone, reservoir outflow: metapotamal, no migratory fish	
HU Lake Tisza ANS560	Main use: flood protection, irrigation Main physical modification: reservoir operation (other), abstractions, dam/embankments with raised lake water level, changed residence time, weir or other structure with lake water level regulation Adversely affected physico-chemical elements (at least moderate): oxygen; nutrients, transparency	Category changed from river to lake (cut-off meander and wetland created by damming) 1 SWB structured by sixteen islands and ten channels connecting the basins Former river: lowland, calcareous, medium to fine substratum, very large catchment, small slope Reservoir: surface area >10 km², mean depth <5 m Within natural fish zone, tributary and outflow: metapotamal	Moderate ecological status Moderate ecological potential *Natura 2000*
LT Kauno Marios LT110050001	Main use: hydropower, recreation Main modification: reservoir operation (hydropower) Adversely affected physico-chemical elements (at least moderate): nutrients	Category changed from river to lake Former river: lowland, calcareous Reservoir: surface area 47.5 km², mean depth 7.3 m No information on natural fish zone	Bad ecological status (based on macroinvertebrates and phosphorus) Bad ecological potential *Natura 2000*
LV Riga HPP (hydropower plant) Impoundment E048SP	Main use: hydropower Main modification: dam/embankments with raised lake water level Adversely affected physico-chemical elements (at least moderate): nutrients	Category changed from river to lake Former river: lowland, calcareous Reservoir: surface area 3,547 km², mean depth 7.1 m, residence time <1 week, brown-water, high hardness	Moderate ecological status Moderate ecological potential *No protected area*

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
		Within natural fish zone, tributary and outflow: epipotamal	
NL Binnenschelde NL25_42	Main use: flood protection, recreation, drainage, urbanization Main physical modification: reservoir operation (other), shore fixation or modification, dams/embankments with raised lake water level, changed residence time, Weir or other structure with lake water level regulation Adversely affected physico-chemical elements (at least moderate): transparency, salinity, acidification, nutrients, specific pollutants	Originally part of a coastal SWB, which became a lake Lake: lowland, siliceous, catchment <100 km², surface area 0.5-5 km², mean depth <5 m Within natural fish zone, migratory fish present	Poor ecological status (based on phytoplankton and fish) Poor ecological potential *Neighbouring SWB Natura 2000*
NO Goppollvatnet 002-263-L	Main use: hydropower Main physical modification: reservoir operation (other), dams/embankments with raised lake water level, changed residence time Adversely affected physico-chemical elements (at least moderate): only minor effects	No change of category Lake: mid-altitude, catchment <100 km², surface area 0.5-5 km² Within natural fish zone, migratory fish present	Moderate ecological status (based on fish) Moderate ecological potential *No protected area*
PL Firlej lake	Main use: recreation, urbanisation Main physical modification: shore fixation or modification Adversely affected physico-chemical elements (at least moderate): nutrients	No change of category Lake: lowland, calcareous, catchment 3.8 km², surface area 0.86 km², residence time >1 year Outside of natural fish zone, no migratory fish (without significant tributary or outflow)	Bad ecological status (based on phytoplankton; macrophytes moderate, fish and phytobenthos high) Bad ecological potential *Area designated for the protection of habitats or species*
RO Isalnita Reservoir WB 1- ROLW7-1_B120	Main use: water supply Main physical modification: abstractions, weir or structures with lake water level regulation Adversely affected physico-chemical elements (at least moderate): only minor effects	Category changed from river to lake Former river: lowland, siliceous, catchment area >1,000 km² Reservoir: surface area 0.5-5 km², mean	Moderate ecological status (estimated based on benthic invertebrates and fish) Good ecological potential

Country case	Main uses and physical modifications	Change of category; Key characteristics of former river / current lake or reservoir	Ecological status at designation and classified ecological potential of HMWB
		depth <5 m, residence time <1 week Within natural fish zone, potamodromous fish species present	*Natura 2000*
SE Rusfors dämningsområde	Main use: hydropower Main physical modification: reservoir operation (hydropower with hydropeaking), dams/embankments with raised lake water level Adversely affected physico-chemical elements (at least moderate): This has not been applied due to a lack of data	Category changed from river to lake Former river: mid-altitude (200–800 m), siliceous, catchment area >1,000 km^2 Reservoir: surface area 50–500 km^2, mean depth 3–15 m, residence time <1 week Within natural fish zone, diadromous fish present	Probably poor or bad ecological status Poor ecological potential

4 Overview of methods

Approaches for ecological potential definition

Five countries indicate to follow the reference approach and six countries follow the mitigation measures approach in order to define ecological potential for lakes/reservoirs in the 3rd RBMPs (Table 4). The steps of the mitigation measures and the reference approaches are described in Chapter 5.3.1 and 5.3.2 of CIS Guidance Document no. 37. Four countries use a combination of these approaches or other approaches as briefly described in Table 4 and Table 5. While several countries follow the same approach for rivers and lakes/reservoirs, others use different approaches for these two categories. Further, for lakes/reservoirs, there does not seem to be a dominant approach as for rivers, for which the majority of countries report to use either a combined approach or the mitigation measures approach.

Table 4 Approaches to define the ecological potential in the national methods

Q1,4 Which approach for ecological potential definition do the methods follow?	
Reference approach (steps ABCDEFGH)	CY, CZ, DE, EL, LV
Mitigation measures approach (steps AB[CDB]HG(F))	FI, HU, IT, NL, NO, SE
Combination of reference approach and mitigation measures approach	AT, LT, PL, RO
Different approach – please explain	ES, FR, HR, PT

Note: Status of the methods as of autumn 2020

The following Table 5 provides brief explanations and descriptions provided by countries on the approach used to define ecological potential in their 3rd RBMPs.

Table 5 Explanations on route or approach used for defining ecological potential

Reference approach (steps ABCDEFGH)	
CY	–
CZ	We used reference approach but only partly - steps A, D, E, F, G and H partly and only for 3rd RBMP
DE	–
EL	For Reservoirs (selected HMWB example for this questionnaire) GEP is derived from the BQE values at MEP and the approach is based only on biological quality elements
LV	–
Mitigation measures approach (steps AB[CDB]HG(F))	
FI	–
HU	–
IT	The measures approach was followed for invertebrates, macrophytes and fish. For phytoplankton and phytobenthos the GES values were used as it was assumed that the phytoplankton and phytobenthos methods are not sensitive to hydromorphological alterations.
NL	We used the 'Prague approach': KRW-18-04-handreiking-KRW-doelen-Stuurgroep-handreiking
NO	Ecological potential is defined by the mitigating measures considered necessary to achieve best possible ecological status without substantially affecting water use.
SE	In this example we have used the mitigation measure approach, although we have national guidance on both methods.

Combination of reference approach and mitigation measures approach	
AT	Mitigation measures approach is combined with guideline values for biological elements
LT	–
PL	steps AB(CE)H(G)F
RO	Ecological potential is defined using a hybrid approach which combines the reference approach and the Prague approach (based on the identification of mitigation measures). The combined method has as basis the undertaking of key steps, the sequence and correspondence of which follows the steps recommended in European Guidelines No. 37
Different approach	
ES	Phytoplankton BQE is being used to assess the ecological potential of reservoirs. The method was intercalibrated within the Lakes Mediterranean GIG. See intercalibration technical reports for further details. For heavily modified lakes (not reservoirs), most River Basins apply natural water body conditions There is an ongoing task to develop a method for lakes and reservoirs
FR	While waiting to be able to define classes of ecological potential according to a WFD-compatible approach, the evaluation of the ecological potential is defined by a mixed method using data from biological quality elements, physico-chemical quality elements, and an analysis of the remaining hydromorphological pressures after the implementation of mitigation measures. In this method, only the phytoplankton quality element is used as an BQE, because it is assumed to be the least sensible to hydromorphological alterations. As such, GEP for this BQE corresponds to the same values as the very good or good ecological status of a natural water body.
HR	Reference conditions are defined exclusively for natural water bodies, and an ES /EP assessment is also given for HMWB, so that good ecological potential (GEP) as a relative measure is determined by the maximum ecological potential (MEP), which is the reference state for HMWB. The MEP is determined by determining the expected biological values.
PT	Reservoirs are classified considering physico-chemical and biological elements (phytoplankton)

Note: Status of the methods as of autumn 2020

Status of methods development

Concerning the status of development of the methods reported, the following is noted:

- In the majority of the countries (15), the reported methods are the official methods adopted for defining ecological potential in the country.
- In two-thirds of the countries (11), the methods are already developed and being used for the 3rd RBMPs.
- In four countries, although the methods are developed, they are still being tested in pilot cases but the methods will soon be applied in the 3rd RBMPs.
- In two countries, the methods are in early stages of development and application in test cases had not started yet at the time of filling in the intercomparison questionnaire.

Further explanations on the status of methods development were provided by countries as shown in Appendix 1 to this report.

Table 6 Status of method development (Q1,1)

Status of method development	Country
Official method in the country	CY, CZ, DE, EL, ES, FI, FR, HU, IT, LT, NL, NO, PL, PT, SE

Status of method development	Country
Method already developed and being used in 3rd RBMPs	CZ, DE, ES, FI, FR, HR, IT, NL, NO, PL, RO
Method developed but still being tested in pilot cases; it will soon be applied in 3rd RBMPs	AT, HU, LT, LV
Method is in early stages of development and application in test cases not started yet	BG, IS
Other	DK *

* DK reports that the country "has no lakes classified as HMWB and therefore no methodology for defining or assessing ecological potential for the water category Lake".

Note: Status of the methods as of autumn 2020

Comparison of the methods used for rivers and lakes

In 13 countries, the method for ecological potential definition and assessment for lakes/reservoirs as described in the questionnaire is conceptually the same as applied to rivers but adapted to lakes/reservoirs. Three countries use conceptually different methods.

Table 7 Comparison of methods used for rivers and lakes (Q1,2)

Lakes *vs* river methods	Country
Lake method is conceptually the same as applied to rivers but adapted to lakes/reservoirs	AT, DE, FI, FR, HR, HU, IT, LT, LV, NL, NO, PL, RO
Lake method is conceptually different from the method applied to rivers	CY, CZ, PT
Other	EL, ES

Note: Status of the methods as of autumn 2020

The following table provides brief explanations and descriptions provided by countries on how the methods for lakes compare to the methods for rivers.

Table 8 Explanations on the method for lakes compared with the method for rivers (Q1,2)

Conceptually the same but adapted to lakes/reservoirs	
DE	Same concept for measures and hymo conditions (for reservoirs); BQE assessment adapted to lakes; the main pressure for lakes (including reservoirs) are nutrients, therefore the BQE assessment methods consider nutrient sensitivity but also hymo sensitivity; in most cases ecological potential comparable to ecological status
FR	The only difference between the national GEP method in lakes and rivers is that phytobenthos is used as a BQE in rivers, while phytoplankton is used in lakes.
HR	In the River Basin Management Plan 2016-2021, the reservoirs were assessed as natural water bodies - rivers and their ecological status was assessed. After the establishment of the ecological potential classification system, the conditions for the final confirmation of reservoir from candidate status to HMWB status were met. Their final confirmation will be done in the 3rd River Basin Management Plan.

Conceptually different	
HU	The most comparable water body category for the Tisza-tó is a lake. Therefore, we applied similar method for status assessment that was developed for shallow lakes.
PT	The assessment system was developed considering the particular characteristics of reservoirs (similar to lakes, as they have a considerable residence time)
Other	
EL	The reference approach is applied. For Reservoirs the approach is based only on BQEs.
ES	Phytoplankton is the BQE used to determine the ecological potential of reservoirs, in accordance with the conditions set out in Decree 817/2015. For heavily modified lakes (not reservoirs), most River Basins apply natural water body conditions defined in Decree 817/2015 (benthic invertebrate fauna, other aquatic flora, phytoplankton, transparency, acidification status, nutrient conditions). There is a methodology under development for ecological potential definition and assessment of lakes which is conceptually similar to the existing method for rivers

Note: Status of the methods as of autumn 2020

Level of method application

In almost all countries responding to the questionnaire, the method used for defining ecological potential for lakes/reservoirs is applied in the whole country (national level). One country (NL) uses a national framework for setting GEP (national level), while the process is carried out by water authorities on water body and BQE level and endorsed by the Provinces (also water authorities).

Steps of the CIS Guidance Document no. 37 included

All countries that responded to the Lakes/Reservoirs intercomparison questionnaire include or plan to include one or more steps that are equivalent to the different steps described in the CIS Guidance Document no. 37.

All steps have an equivalent in the methods of the large majority (more than two-thirds) of countries, only Steps B1, C and the assessment of disproportionate costs/infeasibility is represented in slightly fewer countries (in 13 countries or less).

The steps most commonly included in the national methods (at least 15 of 19 countries) are step A, step B2, step F, step G, and step H. Also, the use of monitoring to classify ecological potential is part of the methods in 18 countries.

Seven countries have methods with all steps included (AT, DE, EL, LV, LT, RO, SE).

Table 9 Overview of countries with methods reported to have (Yes) or have not (No) an equivalent step

	MEP definition							GEP definition			Implementation		
	Step A	Step B1	Step B2	Step B3	Step C	Step D	Step E	Step F	Step G	Step H	Moni-toring	Costs	Monitor effects
AT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CY	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
CZ	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EL *	Yes	(Yes)	(Yes)	(Yes)	Yes	Yes	Yes	Yes	Yes	(Yes)	Yes	(Yes)	(Yes)
ES **	Yes	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)	Yes	(Yes)	(Yes)
FI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No ***	Yes
FR	Yes	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
HR	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
HU	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
IT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NL	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Yes
NO	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes
PL	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No
PT	Yes	No *	No *	No *	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes
RO	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	**19**	**14**	**16**	**15**	**13**	**15**	**15**	**18**	**17**	**16**	**19**	**15**	**17**
No	**0**	**5**	**3**	**4**	**6**	**4**	**4**	**1**	**2**	**3**	**0**	**4**	**2**

Names of steps in table:

- Step A. Identification of closest comparable water category,
- Step B1. Identify mitigation measures relevant to each of the hydromorphological alterations and ecologically effective in the physical context of the water body,
- Step B2.Exclude mitigation measures with significant adverse effect on use or wider environment ,
- Step B3. Select most ecologically beneficial (combination of) measures taking into ac-count need to ensure best approximation to ecological continuum,
- Step C. Derivation of hydromorphological conditions for MEP,
- Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type,
- Step E. Derivation of BQE conditions for MEP,
- Step F. Derivation of BQE conditions for GEP,
- Step G. Derivation of supporting quality element conditions for GEP,
- Step H. Identification of mitigation measures for GEP.
- Monitoring to assess whether GEP is being achieved
- Are there GEP measures that are disproportionally expensive or infeasible?
- Implement GEP measures and monitor effects on BQEs and supporting quality elements

* The „Yes“ provided by EL in the questionnaire for steps B1, B2, B3, H, Costs and Monitor effects should be "No", as EL explains that for Reservoirs (selected HMWB example for this questionnaire) steps B1, B2 and B3 are applied during the designation of HMWB. Identified mitigation measures are not applied for MEP or GEP definition. For H, Costs and

Monitor effects, there is no equivalent step. In a later comment, also PT stated that the steps B1 to B3 were already performed during HMWB designation and are reviewed for each cycle.

[**] A national approach is under development and will be ready along the following months. This methodology is conceptually similar to the existing method for rivers. (The entries in the table were corrected from “No” in the steps B1-H & Costs & Monitoring to (Yes).

[***] In the Finnish method disproportionate costs are not analysed as part of the GEP assessment. However, the initial screening of measures to reach GEP, includes selection of measures that are technically and economically feasible. The assessment of disproportionate costs may be conducted in a later stage of defining programme of measures and setting environmental objectives for the water bodies. It should include assessments of benefits/cost-effectiveness.

5 Pre-step. Designation of HMWB & information from earlier planning cycles

5.1 Introduction to step

In this pre-step, information on the assessment of biological and hydromorphological impacts from the designation phase of HMWB and existing monitoring results are used to support the subsequent steps of defining MEP and GEP.

The information below focuses on the designation phase of HMWB, especially on the identification and assessment of hydromorphological impacts and alterations causing failure of good status and causing a change in character. This should be based on the application of suitable methods for the assessment of hydromorphological quality elements, capable to detect hydromorphological modifications and inform solid links to the sensitive biological quality elements.

5.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- In almost all countries which submitted a questionnaire, the **designation of HMWB** is based on the **principles and steps of the CIS Guidance Document No. 4**, adopted by the Water Directors in 2003 (HR: partly). In most countries, the designation of HMWB had already been reviewed for the 3rd planning cycle at the time of filling in the intercomparison questionnaires, while for two countries this review was still outstanding.
- All countries have been able to identify the **physical modifications** in their specific HMWB cases. There are typically multiple physical modifications. The most common physical modifications[4] in the specific cases were dams/embankments with raised lake water level and reservoir operation.
- All countries have identified the **relevant uses** for designating their specific HMWB cases, and in six of 16 cases there were multiple relevant uses. Most common use in the specific cases was hydropower.
- All countries have identified the **hydromorphological supporting elements** directly or indirectly changed as a result of the physical modifications in their specific HMWB cases. Most countries (13 of 16 HMWB cases) provided a description of the nature of the changes with a varying level of detail, in many cases lacking any quantitative assessment.
- Most countries (14 of 16 HMWB cases) have been able to identify the **physico-chemical supporting elements** affected directly by the physical modifications or indirectly due to changes in the hydromorphological character of the water body in their specific HMWB case. Several

[4] Countries were asked to indicate the main physical modification(s) that led to the designation of the selected HMWB, choosing from a list of "most common" physical modifications for European HMWB lakes/reservoirs. The most common physical modifications for HMWB lakes/reservoirs were selected on the basis of ECOSTAT country responses to a mini-questionnaire that was circulated for this purpose in spring 2020. For European HMWB lakes/reservoirs, the most common physical mofidications identified through that ECOSTAT survey were:

- Reservoir operation - hydropower with hydropeaking
- Reservoir operation - others
- Shore fixation or modification (erosion control e.g. revetment, rip-rap, foreshore armouring, sheet piling)
- Abstractions
- Dam/embankments with raised lake water level
- Changed residence time (e.g. through modification of a lake outlet)
- Weir, barrage, lock or other structure with lake water level regulation

HMWB examples reported major effects on transparency, thermal conditions, oxygenation, and nutrients.

- All countries have identified at least one **BQE** adversely affected in their specific HMWB case. Effects on BQEs are comparable in rivers that changed their category to a reservoir, and in heavily modified lakes. In some cases, it was unclear from the responses whether the former river or a comparable lake type was chosen as reference against which the ecological status based on the BQE was assessed. Three countries reported moderate or major effects on phytoplankton, although it is unclear whether the changes resulted from the physical modification or occurred as secondary pressure and not related to the physical modifications which led to the designation as HMWB. Most countries reported major effects on macrophytes, benthic invertebrates and fish. For phytobenthos, major effects were reported only in one case study.
- The **overall ecological status** was assessed at designation of the HMWB by all countries. In all examples submitted for the intercomparison it is moderate or worse when assessed using methods for natural water bodies of the same type.
- Concerning the availability of **monitoring data at the designation phase**, in almost all countries which submitted a HMWB case study, detailed monitoring data on hydro-morphological conditions and on BQEs were available. No hydro-morphological monitoring data were available in two countries. One country reported *yes/no*, since monitoring data were available only for one BQE.
- Two-thirds of the countries reported that **biological assessment methods**, which were used at the designation, are **sensitive to hydro-morphological alterations** in lakes/reservoirs or in rivers which changed their category to lakes. There is no common view on which BQE is most sensitive. Four countries reported that the BQEs macrophytes, benthic invertebrates and fish were most sensitive. Three countries used proxy methods; two countries refer to external documents (legal regulations).
- **Mitigation measures** were in place **prior to designation** of the water body as HMWB only in seven of 16 countries, e.g. in NL and NO to improve the habitat conditions for fish, in EL on environmental flow in downstream water bodies.
- There is no **transboundary** waterbody among the case studies but in AT the catchment affected is transboundary. The selected examples of very few countries are of transboundary nature. Actions to coordinate the process of harmonization on status/potential assessments is mentioned in the case of SK (SK/HU Transboundary Commission). Indirect long-term transboundary relationships are present in the NL (Ijsselmeer), which is part of the Rhine Commission's coordination.

Unclear issues / gaps

- There are some uncertainties in the country responses to the question on the reference against which the ecological status based on the BQE was assessed at designation (Q4,11). Further clarification by countries would be useful to understand whether this assessment is made using a lake type or a river type as reference.

Table 10 Explanation on the use of biological assessment methods sensitive to hydromorphological alterations in lakes at the stage of HMWB designation

Q4,14 Have biological assessment methods been used which are sensitive to hydromorphological alterations in lakes/reservoirs?	
Yes	
AT	**Macrophyte** Index AIM reacts clearly to water level fluctuation. Fish Index ALFI is also sensitive, but in this case all main habitats are still available in the lake
CZ	Some of the metrics which are part of the assessment method of **macrophytes** and **fish** are known to be sensitive to hymo alterations of reservoirs and lakes. Fish assessment method was used only for 2nd RBMP, not for 3rd RBMP.

ES	For lakes, the metrics included in the Spanish regulation RD 817/2015 (BOE 2015) cover, in general, the purpose for which they were designed, and respond to the specific pressure types. Thus, the whole set of existing pressures and threats on Spanish lakes can be assessed by the different approved metrics. In the document "Spanish system for the assessment of the ecological status of lake water bodies: pressure level estimation and response of metrics", in table 6: Summary of the metrics approved in the Spanish law showing statistically significant responses to the main pressure groups.
FI	Aquatic **macrophytes** and littoral benthos is monitored regularly
HR	The hydromorphological pressures that influenced the formation of HMWB were included in the determination of ecological potential. No further information on biological assessment methods sensitive to hymo alterations.
HU	Benthic **macroinvertebrates** are investigated.
LV	Partly. Only **macroinvertebrate** and **fish** indices are sensitive to hymo modifications. Macrophytes and phytoplankton, used in assessment, are more sensitive to eutrophication.
NL	*Reference to two reports:* - BG5018WATRP1907091043_Eindrapport KRW-Verkenneranalyses_WSBD_DEF - 2020-factsheet_OW_25_Waterschap_Brabantse_Delta_2020-11-02-02-40-21[5]
NO	Standard net-**fishing** in the lake and electro-fishing in tributaries. Hydroacoustic in the lake.
PL	**Fish** and **macrophytes** were taken into account at the designation step
Yes/No	
EL	No detailed knowledge exists on the biological impacts especially on reservoir benthic macroinvertebrates and reservoir fish. However, a biological assessment method for **fish** that is used for lakes, is sensitive to hymo alterations. Furthermore, a national biological method based on lake littoral **zoobenthos**, is sensitive to hymo alterations and has just been approved by ECOSTAT (October 2020). Concluding, within the Med GIG it was considered that only phytoplankton is suitable BQE in reservoirs to assess eutrophication, since other BQEs are affected by other factors (e.g. water level fluctuation), resulting from the operation of the reservoirs.
No	
CY	No methods are available
FR	**Proxy methods** which are based on hymo assessment methods have been used. Additionally, the **macroinvertebrate** BQE is sensitive to hydromorphology; however, it is still being developed and therefore not used in the current ecological potential assessment method.
LT	**Proxy methods** which are based on hymo assessment methods have been used
RO	**Proxy methods** which are based on hymo assessment methods have been used. The biological assessment is complemented by hydromorphological assessment.
SE	**Fish** have been classified by expert judgement. Supported by HyMo.

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

[5] https://www.waterkwaliteitsportaal.nl/WKP.WebApplication/Beheer/Data/Publiek?viewName=Bronbestanden&year=2019&month=December, *accedded 7 May 2021*

6 Definition of MEP

6.1 Step A. Identification of closest comparable water category

6.1.1 Introduction to step

This step involves the identification of the most comparable water category (e.g. lake, river, transitional or coastal water) which should in general be derived from the original water category (*i.e.* prior to modification). If a change in category is necessary due to the modifications, the most comparable category should be chosen, e.g. for a reservoir created on a former river, the most comparable water category would be a lake.

6.1.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- All countries have an equivalent to step A on the identification of closest comparable water category in their methods.
- In five of the reported intercomparison case studies, the selected HMWB was originally a lake and remained a lake (reservoir). In one case study, a coastal water changed to a lake, in the remaining 10 case studies a river changed its category and became a reservoir.
- The step is relevant only for rivers which became a reservoir through damming and for coastal waters which became a lake (only NL). The criterion retention time was used by several countries to distinguish between maintaining the river category and changing to a lake category. Generally, this step did not cause any difficulties, as the change from river to a reservoir with increased residence time is without doubts substantial.

Unclear issues / gaps

- In one country (CZ) there are no natural lakes at all, which makes it difficult to compare the newly formed category with the closest comparable lake type.

6.2 Step B1. Identify mitigation measures relevant to each of the hydromorphological alterations and ecologically effective in the physical context of the water body

6.2.1 Introduction to step

Step B1 is the first step in selecting mitigation measures for defining MEP. It involves identifying the mitigation measures that are relevant to the type of hydromorphological alterations or impacts causing failure in achieving good status. To achieve this, Guidance no. 37 recommends carrying out an assessment of the adverse affects of hydromorphological alterations on supporting quality elements and BQEs, and how mitigation measures can contribute to their improvement. It also recommends using a national or European mitigation measures library to guide the selection process. The European library for instance includes information about the water category and water body type, the nature of the physical modification, its effects on the hydromorphological (and physico-chemical) supporting elements and their effects on the BQEs.

The information below focuses on whether countries considered different groups of measures, specifying which specific concrete measures were considered, whether they were expected to improve the conditions of the selected HMWB of the case studies, and whether the achievement of objectives in downstream and upstream water bodies was considered when identifying relevant mitigation measures. It also presents whether countries have explicitly not considered specific groups of measures.

6.2.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- Two-thirds of countries (13 of 19) report having a first step to identify all mitigation measures based on their relevance to the hydromorphological alteration and their ecological effectiveness in the physical context of the selected water body. One of these countries (EL) stated though further below that for reservoirs the mitigation measures are not used for MEP definition.
- More than half of the countries indicate having a national **mitigation measures library** to guide the identification of mitigation measures. Two countries reported using the European mitigation measures library. Some countries do not (yet) define MEP, but first identify all mitigation measures that could be relevant to achieve GEP (e.g. FR, NL).
- Five countries reported that they considered the objectives of **downstream and upstream water bodies** in the selected case study. Two countries indicated not considering these water bodies as it was not relevant. One country reports partial consideration, due to the extremely high costs for fish passes or bypass channels needed to achieve better ecological quality in up/downstream water bodies (although financial reasons should not be considered at this step).
- For the HMWB examples selected for the intercomparison, the following are some key observations on the **selected mitigation measures** for MEP:
    - Generally, fewer measures were identified in lakes/reservoirs compared to rivers.
    - About half of the countries (9 of 16) have identified as relevant the measure of “management of reservoir/lake level”
    - About one third (6) of the countries identified as relevant the measures “Fish migration aids” and “Improvement of connectivity to riverine habitats/tributaries/other lakes”
    - The remaining mitigation measures were identified by only two to four countries.
    - Other measures were identified by six countries.
- The responses of some countries are not fully consistent. Two countries (EL, IT) stated that they included step B1 or an equivalent step but did not list any mitigation measures, while one country (ES) stated that it did not include step B1 or an equivalent step but listed mitigation measures. (As stated later, ES has an equivalent step, which is under development.) Some countries gave no answer on groups of mitigation measures considered (Q6,2) but provided examples of practical measures per group (Q6,4).
- Table 11 presents examples of **concrete measures** identified by countries and their expected benefits.

Unclear issues / gaps

- Like in the responses to the river questionnaire, some countries did not clearly separate between steps B1 and B2 and significant adverse effects on use (SAEOU) were already included in step B1. Drastic measures such as removing the dam of a reservoir and turning it to a river again are not included in the pre-defined measure groups. Only one country (FI) reported dam removal as a measure that is excluded from MEP due to SAEOU but being used to reach GEP in some restoration cases.
- Different views were observed regarding fish migration aids to tributaries (AT: under discussion because of strong water level fluctuations) and fish migration aids to downstream and/or upstream reaches (FI: “essential”, AT: possibly a measure to preserve high status or guarantee genetic exchange).
- From the HMWB examples provided, it is not clear whether the MEP mitigation measures for heavily modified lakes or reservoirs should also include measures that are relevant for achieving good ecological status/potential in other neighbouring surface water bodies. A more common understanding between countries may need to be developed. This may concern mitigation measures in the lake/reservoir that may affect upstream or downstream water bodies (e.g. AT: water level management with effects on e-flow in downstream rivers) or measures that could be taken in a neighbouring water body and are necessary to improve the ecological potential

of the HMWB (e.g. FI: the [downstream] River Kemijoki is fully developed for hydropower and only the lowermost hydropower plant is equipped with fishway. Therefore, it is not yet realistic to plan a fish-way on the mouth of the HMWB. In other cases, where river downstream provides spawning grounds and feeding habitats, a fishway is established as a part of measures of lakes).

Table 11 Concrete measures provided for each group of MEP mitigation measures, and their expected benefits

		Examples of concrete measures	Example expected benefits
Enhancement of shore/shallow habitats (especially in the littoral zone)	FI	Bottom weirs at selected areas	will increase habitats of sensitive species
	HU	modification of water level regulation For winter the reservoir is emptied, only shallow water patches remain. The filling up of the reservoir with water in spring can be taken carefully …	helps spawning habitats (shallow habitats are present in the lake basin and at shores). Water level fluctuation means a control on aquatic macrophytes and does not allow for blue greens to dominate in water. … with taking into account spawning activity
	SE	Manage shore/shallow habitats	–
Creation of secondary habitats	ES	Regeneration of drained areas of the lake	–
	HU	The four basins are differently managed, only one basin is intensively used for recreation.	–
	FI	Restoration of shallow bays with bottom weirs	helps spawning of spring spawning fishes and acts also habitat for waterfowl
	LV	More potential habitats in embanked parts	–
Removal/replacement of shore fixation	AT	–	minor effects on hydromorphological structures/shore; only minor effects on macrophytes can be expected, main effect is water level fluctuation
	ES	Removal of embankments which modified the hydromorphological dynamics of the lake	–
	PL	Removal of bank/shore regulation	–
Management of reservoir/lake level	AT	fluctuation was changed from 11.5 m to 6 m in winter and less fluctuations in summer (tourism, bathing water); to achieve major improvement, fluctuations should be reduced to <1-2 m	effects on vegetation zonation of macrophytes
	ES	Removal of embankments which modified the hydromorphological dynamics of the lake Reduction of water abstractions	–
	FI	Reduction of water level drawn down. Water level should also be reduced during late autumn	improve general status of lake. avoid erosion.
	HU	see above [→ *Enhancement of shore/shallow habitats (especially in the littoral zone)]*	see above
	LV	Water level management	–

		Examples of concrete measures	Example expected benefits
Management of sediments	HU	The lake suffers from sedimentation. During 2016 dredging was performed, continuation of this is still needed.	–
	SE	prevent unnatural erosion	mitigate lack of erosion
Management of lake use / designation of protected areas	ES	Measures included in the Management Plan of the RN2000 Site	–
	HU	Protected areas exist on large areas, intention to preserve them. Natura 2000 sites are present in the basin.	–
Ecologically optimised fisheries management	FI	Management of declined trout populations by stocking	–
	HU	see above *[→ Enhancement of shore/shallow habitats (especially in the littoral zone)]*	see above
Fish migration aids /Improvement of connectivity to riverine habitats/tributaries/other lakes	AT	Fish assessment shows high status, so no improvement necessary	could be a measure to preserve high status, guarantee genetic exchange,...
	FI	Connectivity to downstream is also essential.	–
	HU	The dam creating the reservoir has a fish pass	–
	SE	Fish migration aids	–
Mitigation of effects on physico-chemical parameters in lake	–	–	–
Other	ES	See Q6,2: Improvement of the hydromorphological dynamics of the lake by means of morphological amelioration and modification of water fluxes	–
	PL	Removal of infrastructure related to tourism and recreation	–

Note: Status of the methods as of autumn 2020

6.3 Step B2. Exclude mitigation measures with significant adverse effect on use or wider environment

6.3.1 Introduction to step

The next step after creating an initial list of mitigation measures for MEP is to exclude measures that have significant adverse effects on use (SAEOU) or the wider environment. According to CIS Guidance Document No.4, MEP represents the maximum ecological quality that could be achieved for a HMWB once all mitigation measures that do not have significant adverse effects on use or on the wider environment have been applied.

The following issues are considered as necessary to be addressed in order to achieve a transparent and clear process for assessing significant adverse effects:

- Issue 1: Define the key uses and the scope of wider environment interests
- Issue 2: Define the benefits of the key uses and of wider environment
- Issue 3: Define in generic terms the types of effects of measures on the key uses and the wider environment
- Issue 4: Define the scale of assessment of significant adverse effects for each key use and the wider environment

- Issue 5: For each key type of adverse effect, define criteria for assessing adverse effects and thresholds of significance

6.3.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- 15 of 19 countries that submitted a questionnaire and 13 of 16 countries that provided a HMWB case study reported to have a step to assess SAEOU. Less than a third do not cover this step.
- From the countries which have reported a step to assess adverse effects and submitted a case study, about half have a general or national method in place, which applies to all (3 countries) or some (6 countries) uses and on the environment. Four countries report having a different approach, and three countries do not have a method.
- Four countries have a method that defines **benefits** of different water uses and the wider environment and a method that defines different types of **adverse effects**. Examples of benefits and adverse effects are provided in Table 12. The compiled list of reported benefits and adverse effects presents a range of economic, social and environmental factors.
- Three countries have **excluded measures** in the case study provided due to SAEOU, while five countries did not rule out measures at this step. Like for rivers, some countries report that they did not consider excluding measures at this step because they were excluded already from the onset (e.g. RO).
- Six countries have, in their national method, specific **criteria to assess significance** of the adverse effects. The criteria listed by the countries are almost identical to those used in the methods reported for rivers. The countries used mainly economic criteria (e.g. % loss in production or economic loss), partly also social criteria (loss of recreation benefits) and environmental criteria (e.g. conflicts with CO_2 reduction targets). Quantitative thresholds have been provided by three countries (LT, RO, SE) for hydropower, flood protection, irrigation and recreation. In FR, the adverse effects are defined by expert judgement based on a technical and socio-economical analysis by consultancy with stakeholders' engagement. However, preliminary works are currently under way in order to support the expert judgement.
- Similar to the methods reported for rivers, countries report carrying out the **assessment of significant adverse effects** at a variety of **levels**: from water body to regional or national. In FR, the scale is defined by expert knowledge on a case-by-case basis, which also means SWB level.
- The overall assessment of step B2 for lakes/reservoirs is overall similar to the assessment for the river category. In most cases a similar approach was used, in some cases the method was less developed for lakes/reservoirs than for rivers. Both for the lake/reservoirs and river categories, the methods are still, for most countries, incomplete and rely to a significant extent on expert judgement. For the countries who reported criteria or thresholds for significant adverse effects in the majority of cases they were similar to those used for the river category. For one use (urbanisation) there was no criteria nor thresholds reported by any country for the lake category, while criteria were reported for the river category.

Gaps, unclear issues and needs for further guidance

- Similar to the responses to the river questionnaire, comparability of the countries is hampered by different views and lack of clear criteria for quantification of significant adverse effects. It is unclear whether criteria are assessed as such ("all or nothing") or with different intensity.

Table 12 Types of benefits of water uses and adverse effects of mitigation measures

Water use	Benefits	Adverse effects of mitigation measures
Navigation	• Environmentally friendly freight transport, tourism-related passenger transport	• Reduction of transport tonnages / abandonment of freight shipping • Reduction of security for persons or goods transport • Reduction/discontinuation of passengers/tourist shipping • Effects on climate change and CO_2 emissions (= negative effects on the environment in the broader sense)
Flood protection	• Protection of settlements (households, businesses) • Protection of infrastructure	• Increased flood risk for surrounding areas and infrastructure • Endangerment of human life
Storage for hydropower	• Electricity production/generation (base load) • Flexibility (control energy, peak load production) • Regional or national energy supply security • Regional or national network security	• Reduction of electricity production (base load) beyond the annual natural fluctuation range • Loss/reduction of peak power generation • Loss of flexibility in providing control and reserve power • Reduction of the regional/national security of supply (security risk) and network security
Storage for irrigation	• Agricultural production • Avoiding loss of permanent crops • Supporting the survival of the agricultural sector • Preventing overpumping from groundwater	• Reduction / loss of irrigation possibility • Reduction of agricultural production volume • Reduction of the agricultural production area • Reduced water availability when releasing environmental flows
Storage for water supply	• Security of supply • Affordable supply of water • Supply with high water quality • Ensuring the drinking water supply • Facilitate the tourism sector	• Reduction/loss of supply security • Deterioration of drinking water quality • Increase in supply costs • Reduced water availability when releasing environmental flows
Recreation	• Recreation, tourism, leisure activities • Angling/fishing	• Loss/reduction of regionally important water sports opportunities (e.g. surfing, sailing, kayaking) • Loss of EU bathing area
Drainage	• Protection of agricultural areas	• Change in production conditions due to increasing humidity • Reduction of the agricultural production area
Urbanisation	–	–
Wider environment	• Healthy environment, biodiversity	• Impact on climate change and CO_2 emissions • Release of hazardous substances • Endangerment of the achievement of objectives Natura 2000 areas • Endangerment of the achievement of objectives of international protected areas (RAMSAR, National Park) • Endangering the impairment of designated archaeological and/or cultural assets

Note: Status of the methods as of autumn 2020

Table 13 Example of criteria used for assessing significance of adverse effects on use

Water use	Criteria used	Quantitative thresholds
Navigation	% of national annual tonnage (AT) % of the annual number of persons transported regionally (local for lakes) (AT) Security Risk (AT)	None provided
Flood protection	Flood risk (AT) Yearly losses in case of floods (monetary) (LV) Increase the damages related to buildings, agricultural lands, roads, railways, bridges (RO)	Loss of 20% [in the damages to buildings, agricultural land, roads, railways and bridges] yearly (RO) Threshold criteria are used in several levels (LV)
Storage for hydropower	% loss of national annual electricity production (AT) % loss of national annual peak electricity production (AT) % loss of local/national flexibility (AT) Loss of energy production on the level of unit of HPP and complex of HPP (RO) Loss of electricity benefits, calculated by multiplying total cascade HP capacity (in kW) and the selling price (LT) Conflict with CO_2 reduction targets (AT) Exact figure and exact figure (SE)	Loss of energy of 2% on the level of HPP unit (RO) 5% on the level of HPP complex (RO) 1.5TWh (SE) Electricity benefits = total HP capacity (in kW) × selling price (LT)
Storage for irrigation	% reduction – regional level (AT) Loss of agricultural production (absolute value) (RO) Degree of reduction of water availability (CY)	Loss of 20% [of agricultural production] yearly (RO)
Storage for water supply	Local necessity for water treatment (AT) % increase – local level (AT) Degree of reduction of water availability (CY)	None provided
Recreation	Impact on regional tourism e.g. % reduction of seasonal overnight stays, number or % loss of tourism jobs (AT) Changing recreation places LT)	Loss of recreation benefits = the value of 55 % of population within a 5 km buffer strip around HP cascade reservoirs lost (LT) Recreation benefits = the value of 55 % of population within a 5 km buffer strip around HP cascade reservoirs lost (LT) Angling benefits = the value of 1.5 fisherman per 1 ha of reservoir surface lost (LT) Not relevant so far (AT)
Drainage	% reduction – regional level (AT)	None provided
Urbanisation	–	None provided
Wider environment	Conflicts with CO2 reduction targets (AT)	None provided

Note: Status of the methods as of autumn 2020

6.4 Step B3. Select most ecologically beneficial (combination of) measures taking into account need to ensure best approximation to ecological continuum

6.4.1 Introduction to step

Having excluded from the initial list of potential mitigation measures those that would have a significant adverse effect on use or the wider environment, the next step is to select the measure or combination of measures that deliver the best improvement in ecological function and address all relevant hydro-morphological alterations, taking into account the need to ensure best approximation of ecological continuum.

Overall, mitigation measure(s) selected for the definition of MEP and GEP are assumed to deliver sufficient improvements to aspects of ecological functioning. Improvements to ecological functioning should clearly relate to the key impacts of the physical modifications.

6.4.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- The majority of countries (14 of 19) report to have an equivalent to step B3 to select the most ecologically beneficial (combination of) measures taking into account the need to ensure best approximation to ecological continuum. The methods of five countries do not have an equivalent step.
- For about two-thirds of the HMWB examples, information was provided on the mitigation measures finally selected as the most ecologically beneficial for MEP. One country (ES) did not discard any measure at this step, while another country (PL) could not identify any measure as applicable. The remaining countries did not select any measures, mainly as they have no equivalent to step B3 in their method at all (CY, CZ, EL, HR) or do not explicitly derive MEP as such (NL).
- Only for four countries, enough information and data were available to assess whether the measures selected for MEP can deliver sufficient improvements to ecological functioning. For six countries, such information and data were either partly/not available or not applicable.
- Seven countries (of 16 with case studies) reporting on the mitigation measures finally selected were also able to explain how the need to ensure best approximation to ecological continuum was taken into account for the selection. In addition to the countries that have no equivalent to step B3 in their method (CY, CZ, EL, HR), four countries did not provide an explanation on how to account for the best approximation to ecological continuum.
- The interpretation of best approximation to ecological continuum at MEP varies a lot, possibly as it should be considered at a scale that is larger than the HWMB itself. In addition, in some countries it is under discussion (AT) or discarded for financial reasons (not possible to achieve longitudinal connectivity, because it is too expensive) (LV).

Unclear issues / gaps

- Several countries were not able to apply this step, partly because the method was under development, partly because the selection of mitigation measures started already with an *a priori* exclusion of irrelevant or unrealistic (SAEOU) measures.

Table 14 Final selection of MEP mitigation measures based on sufficient data concerning ecological improvements and the need to ensure best approximation to ecological continuum

	Yes	No	Other	No answer
Q8,2 Country **indicated which of the mitigation measures were finally selected** as the most ecologically beneficial (combination of) measures for the MEP of the selected HMWB	AT, ES, FI, FR, HU, LV, NO, PL, RO, SE			CY, CZ, EL, HR, LT, NL
Q8,3 Country had **enough information and data available to assess whether the measures selected for MEP can deliver sufficient improvements to ecological functioning**	AT, ES, NO, RO	FR, HU, SE	FI, LV, PL	CY, CZ, EL, HR, LT, NL
Q8,4 Country **explained how the need to ensure best approximation to ecological continuum was taken into account** for the selection of MEP mitigation measures for this HMWB	AT, ES, FI, LV, NO, PL, RO	FR		CY, CZ, EL, HR, HU, LT, NL, SE

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

Table 15 Interpretation of best approximation to ecological continuum at MEP

Q8,4 Explanations on how the need to ensure best approximation to ecological continuum was taken into account	
AT	Benefit and feasibility under discussion
ES	Ecological continuum of flow, sediments and biota is a milestone for the improvement of the lake condition. As such, it was considered centrally in the definition of the measures.
FI	Mitigation measures for MEP include fish passes and also fences preventing accidental downstream migration.
FR	MEP is not defined in the national method, therefore we cannot answer the question.
LV	It is not possible to achieve longitudinal connectivity, because it is too expensive. Lateral connectivity is partly possible also without mitigation measures.
NO	It was taken into account; ecological continuum is important in this water course for maintaining strong fish stocks.
PL	The ecological continuity of watercourses is taken into account as one of the critera in multi-criteria analysis used in the designation tests 4.3.a and 4.3.b to analyse and balance the adverse and positive effects of the mitigation measures on the wider environment (Not applicable in the context of the selected WB, which is a lake without significant tributary / outflow).
RO	We follow the Guideline no. 37 step by step. The need to ensure best approximation to ecological continuum was taken into account, also in relation to the achieving of environmental objectives of the upstream and downstream water bodies. For the alterations which hinder the river connectivity, mitigation measures from the catalogue have been selected.

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

6.5 Step C. Derivation of hydromorphological conditions for MEP

6.5.1 Introduction to step

The derivation of hydromorphological conditions for MEP should be based on the hydromorphological conditions in the water body altered by the physical modifications linked to the use and a prediction of the effects of the set of mitigation measures (for MEP) on hydromorphological conditions. MEP hydromorphological conditions are impacted by physical modifications. The values for the biological and general physico-chemical quality elements at MEP depend on the MEP hydromorphological conditions. The hydromorphological conditions may resemble those of a different type compared to the natural water body type before the physical modification. Thus, the hydromorphological conditions defined for MEP can be used to identify or derive the closest comparable water body type, which is in particular relevant for defining the MEP conditions for biological quality elements and those physico-chemical parameters which are affected by the hydromorphological conditions.

6.5.2 Key findings of the intercomparison

- Like for the methods reported for rivers, two-thirds of countries (12 of 19) report to have an equivalent to step C to derive hydromorphological conditions for MEP. One-third of countries though do not have an equivalent step in their method and several of those follow the mitigation measures approach. One country (EL) stated that it had a step equivalent to step C but could not provide an explanation to the case study as the existing BQE approach based on phytoplankton is not sensitive to hydromorphological modifications. Another country (HU) did not provide a description of the general method / approach to derive hydromorphological conditions for MEP, although hydromorphological conditions for MEP for the selected HMWB were derived[6].
- Only half of the countries could actually derive hymo conditions for MEP for the HMWB examples selected for the intercomparison. The aspects that were considered by most countries (two-thirds) for deriving MEP hymo conditions for the selected HMWB were the current hymo conditions altered by the physical modifications, which is obvious for rivers which changed their category to lake. Five countries used a prediction of the expected effects of mitigation measures defined for MEP or reference conditions of the original water body type.
- For five of the HMWB examples selected for the intercomparison, the derived hydromorphological conditions for MEP have been used to identify or derive the closest comparable water body type. For four examples, other aspects were used to derive the closest comparable water body type. In the remaining seven cases no answer was provided.

Unclear issues / gaps

- The method to derive hymo conditions for MEP is poorly described in most cases, often based on expert judgment without explanation how this was done. In several cases no method exists at all and in some cases the method is under development.

[6] Explanation of HU (missing from the questionnaire): "Analyses of attributes used for WB type definition among the attributes of hydromorphological conditions for MEP resulted in closest comparable WB type. Hydromorphological conditions for MEP of the most comparable hydromorphological type was used, adding the differences originating from the use"

6.6 Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type

6.6.1 Introduction to step

The physico-chemical conditions for MEP result, inter alia, from the hydromorphological conditions at MEP and a prediction of the effects of the mitigation measures (for MEP) on physico-chemical parameters, which is comparable to an assessment of the remaining impacts. The identification of the closest comparable water body type is a supportive tool in this context. For physico-chemical parameters, the starting point is in general the original natural water body type prior to physical modification. For those physico-chemical parameters that are significantly modified by the hydromorphological alterations causing the heavily modified character, and that cannot be mitigated, other types should be considered (the closest comparable natural water body type, or combinations of water body types). Requirements for specific synthetic pollutants at MEP are the same as those for natural water bodies.

6.6.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- The majority of countries (14 of 19) report to have an equivalent to step D to derive physico-chemical conditions for MEP. One quarter of countries though do not have an equivalent step in their method.
- Almost two thirds of the countries (10 of 16 with case studies) could derive physicochemical conditions for MEP for the HMWB examples selected for the intercomparison. The aspect that was considered by most countries (8) for deriving MEP physicochemical conditions for the selected HMWB was the closest comparable water body type. A smaller number of countries considered the aspects of effects of the modifications (6) and effects of the MEP mitigation measures (5) on physico-chemical elements.
- Most countries focussed on nutrients. Concentrations were derived based on hydraulic retention time (e.g. CZ), by comparison with natural water bodies (e.g. high ecological status LT, good ecological status SE), by correlation with biological characteristics (e.g. HR, HU) or by expert judgment (e.g. FI, LV).

Unclear issues / gaps

- No particular unclear issues or gaps

Box 1 Examples of country approaches for deriving physicochemical conditions for MEP

<u>Czech Republic</u>

We estimated concentrations of limiting nutrient (phosphorus) at the reservoir from the MEP Rivers, which have already been set to non-eutrophic conditions, and phosphorus retention in the reservoir based on hydraulic retention time.

<u>Croatia</u>

Only total phosphorus and total nitrogen are used as supportive physical and chemical parameters to monitor eutrophication effects. Values for GEP/MEP are derived from chlorophyll a concentration based on the publication Phillips et al. (2008).

<u>Sweden</u>

MEP mean that the best possible physico-chemical conditions must be achieved under the limiting conditions that the hydromorphological conditions allow. This means that the physico-chemical QE that are not affected by the hydromorphological conditions must achieve such a condition that corresponds to GES.

6.7 Step E. Derivation of BQE conditions for MEP

6.7.1 Introduction to step

The derivation of biological quality element conditions for MEP is based on the identification of the closest comparable water type, the predicted hydromorphological and physico-chemical conditions (for MEP) and a prediction of the values for BQEs based on methods used for status assessment. When deriving BQE conditions for MEP, it is also critical to make sure that best approximation of ecological continuum has been taken into account in step B.

6.7.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- The majority of countries (14 of 19) report to have an equivalent to step E to derive BQE conditions for MEP. One-third of countries though do not have an equivalent step in their method. In 12 of 16 countries that provided HMWB examples for the intercomparison, it was possible to derive BQE conditions for MEP for the selected HMWB. For several cases, this was not possible for different reasons, but mainly because of not having final methods yet or because this step is not part of their method.
- The aspects most frequently considered in countries' methods for deriving BQE conditions for MEP are the closest comparable water body type (10) and the effects of the hymo modifications on BQEs (8). The effects of the MEP mitigation measures on BQE are considered by a smaller number of countries in their approaches (6) (Table 16). Two countries provided explanations why effects of the hymo modifications on BQEs were not considered. HR stated that this had been excluded because hymo degradation was the cause of the creation of the HMWB; however, for BQE assessment, hydrological (residence time) and morphological properties (average depth, altitude, lake volume) were taken into account, so it can be connected in the future. PL stated that in practice the lower limit for GES in the given type of waters will be adopted as MEP limit.

Table 16 Aspects considered for deriving BQE conditions for MEP (Q11,5)

Options	Countries
Closest comparable water body type	AT, CZ, EL (Lake type L-M8), ES, HR, HU (Comparisons were made between water bodies in similar types), LT, LV, PL, RO
Effects of the hymo modifications on BQEs	AT, CY (BQE conditions for MEP i.e. for total phosphorus were determined from reservoirs that fulfilled the pressure criteria *i.e.* from reservoirs the only impacts on the reservoir are those coming from the hydromorphological alterations resulting in their classification as artificial or heavily modified water body *i.e.* from water level fluctuation. Therefore, this aspect is inherent in the data used), CZ, FI, HU (Differences were caused by Hymo alterations), LT, LV, RO
Effects of the mitigation measures for MEP on BQEs	AT, FI, HU (Impacts of mitigation measures on the BQEs were considered), LT, LV, RO
Other aspects	EL (Effect of eutrophication on BQE), PT * (The quality gradient was established considering least disturbed conditions (pressure analysis) and was the base for defining reference values and boundaries)

* no case study provided

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

- The BQEs for which conditions for MEP could be derived in the majority of HMWB intercomparison case studies were phytoplankton and fish (Table 17). Less countries have derived MEP conditions for macrophytes, followed by macroinvertebrates and phytobenthos. In contrast to the information reported for rivers, only a small number of countries have derived conditions for MEP for all five BQE. Nine of 16 countries that provided HMWB examples for the intercomparison stated that all BQE which are relevant for the water category of the selected HMWB are covered. Several countries, especially Mediterranean countries which were part of the intercalibration of ecological status classification methods in reservoirs/lakes, have derived MEP only for phytoplankton. Apart from CY and EL, this is the case also for PT, which did not provide a case study but stated that it had derived MEP conditions for this BQE. All of these three countries stated that all relevant BQE are covered.

Table 17 BQEs for which conditions for MEP could be derived in the HMWB examples (Q11,3)

	Benthic inverte-brates	Fish fauna	Macro-phytes	Phyto-benthos	Phyto-plankton	Explanations by countries
AT		x	x		x	*Benthic invertebrates:* not yet evaluated, method for benthic invertebrates was only developed recently *Phytobenthos:* not relevant in lakes
CY					x	*Benthic invertebrates, fish, macrophytes, phytobenthos:* explanations were provided by the GIG [Geographical Intercalibration Group] and accepted that this BQE is not applicable in Mediterranean reservoirs. Explanations were provided and accepted that this BQE is not applicable in Cyprus reservoirs. *Phytoplankton:* the targeted BQE of this intercalibration exercise was phytoplankton
CZ		x	x		x	
EL					x	
FI	x	x	x			Roughly analysed the change (5-level scale 0-4), see ID11.1.
HR	x	x	x	x	x	*Macrophytes:* But not in lakes where water level oscillations are too high so that macrophyte community cannot develop in the littoral zone because it is shifting too often and too much. *Phytoplankton:* But not in lakes with low residence time where phytoplankton community cannot develop.
HU	x	x	x	x	x	The approach described above [Q11,1] was applied for all BQEs.
LT	x	x	x	x	x	
LV	x					After data analysis it was concluded that only macroinvertebrates are sensitive enough to hymo alterations.
PL		x	x	x	x	*Benthic invertebrates:* not yet, but may be subject to change
PT					x[7]	
RO		x			x	*Macrophytes:* monitoring data available. *Phytobenthos:* not applicable owing to local conditions (substrate not adequate for its development)
SE		x				
SUM	**5**	**9**	**7**	**4**	**9**	

[7] reported by PT but without case study

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

Box 2 Examples of country approaches for deriving BQE conditions for MEP

Czech Republic

The *phytoplankton* assemblages at the reservoir were estimated from calculated phosphorus concentrations. *Macrophytes* were set as an expert estimation of the littoral zone coverage. *Fish*: Phosphorus was chosen as the main stressor also for the fish population but the MEP was derived from the low nutrient water bodies. Any other stressor or limiting factor (morphological) important for fish was not included.

Finland

By implementing the identified group of mitigation measures, the HMWB would be in MEP. There it is central to implement all HyMo mitigation measures that have not significant adverse impact on the use, to achieve ecological continuum, to only take into account sustainable/viable populations of fish and other biota that are adjusted/"naturalized" and reproduce naturally, and leave out direct fish management measures as well as fishing.

After description of the extent and number of all measures (written) into the RBM database, it is estimated how each individual measure impact *fish* (incl. life cycle of migrating fish), *benthic invertebrates*, *macrophytes*, water quality and HyMo. This is done using 5-level scale which is roughly proportioned into the change in EQR: 0 = no change/impact (<0.01 EQR), 1 = minor change (0.01–0.05 EQR), 2 = slight change (0.05–0.1 EQR), 3 = relatively large change (0.1–0.2 EQR), and large change (>0.2 EQR).

Unclear issues / gaps

- The BQE for which most countries could derive MEP conditions (phytoplankton) is usually not significantly affected by physical alterations such as water level fluctuations. Therefore, the definition of MEP conditions often focuses on secondary impacts from point or diffuse nutrient sources. This discrepancy typically occurs in countries that participated in the (successfully completed) intercalibration exercise on ecological *status* classification methods for Mediterranean reservoirs using phytoplankton.

7 Definition of GEP

7.1 Step F. Derivation of BQE conditions for GEP

7.1.1 Introduction to step

Good ecological potential is defined in WFD Annex V 1.2.5 as an ecological state in which “there are slight changes in the values of the relevant biological quality elements as compared to the values found at maximum ecological potential”.

With respect to “slight changes”, HMWB should follow the same principles as natural water bodies, with a functioning ecosystem being a prerequisite for a water body to be at GEP. Slight change cannot be equivalent to a complete/temporary absence or severe change of the biological quality elements relevant for the closest comparable water category and type (e.g. of fish for rivers within the fish zone). Slight changes to the biological quality elements have to be supported by corresponding conditions in the supporting quality elements (e.g. flow, habitats, continuity). With regard to ecological continuum, “slight change” means that a condition close to best approximation of ecological continuum should be ensured (instead of best approximation).

7.1.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- Almost all countries (17 of 19) report to have an equivalent to step F to derive BQE conditions for GEP.
- All countries with an equivalent step F that provided a case study assess the classes “good” and “moderate” of ecological potential (or at least the good/moderate boundary). A few countries do not assess the class “maximum” although in some cases (ES, HR) they stated that the class “good” corresponds to “good and above”. The classes “poor” and “bad” ecological potential are defined in about two-thirds of the countries (Table 18).
- The most common approaches to derive the classes of ecological potential in the majority of countries are:
    - o Assessment methods of natural water bodies with adapted metric values and/or class boundaries (8 of 19 countries that submitted a questionnaire), followed by
    - o New assessment method for heavily modified water bodies (6), and
    - o Expert judgement (4).
- A few countries use assessment methods of natural water bodies with adapted classes or have developed other methods.
- In three quarters of the countries which provided a HMWB example for the intercomparison, BQE conditions for GEP could be derived. The BQEs for which conditions for GEP could be derived in most case studies were phytoplankton, followed by fish and benthic invertebrates. Most countries selected the same BQE for MEP and GEP, the selection differed in three countries. Overall, the majority of countries stated that all relevant BQEs could be covered in the selected HMWB case studies, while this was indicated as not possible in five countries.

Unclear issues / gaps

- The way “slight changes” are interpreted was explained only by few countries and in rather different ways, partly by expert judgment (FI, LV, SE), which makes it difficult to judge on comparability. AT defines “slight” as any change of EQR or metric values, RO as a “minor modification” of BQEs. EL refers to the intercalibration report on the ecological *status* of Mediterranean reservoirs based on phytoplankton.

Table 18 Classes of ecological potential assessed in country methods

Q12,2 Which classes of ecological potential do you assess?						
	Maximum	Good	Moderate	Poor	Bad	Comments
AT	x	x	x			M: moderate, poor and bad are included in class "moderate or worse"
CZ		x	x	x	x	
CY	x	x	x	x	x	
DE *	x	x	x	x	x	
EL	x	x				The G/M boundary is defined.
ES		x	x	x	x	We use "Good and Above Potential" (Decree 817/2015)
FI		x	x	x	x	P and B: On the basis of water quality, not on the mitigation measures.
FR		x	x	x	x	Maximum: not defined G, M. P and B: assessment method from natural water bodies for BQE (but using the phytoplankton BQE) and for physico-chemical conditions + expert judgement for hydromorphological conditions. In the national method, this class of ecological potential is not only "good" but "good or more".
HR		x	x	x	x	We have a category called “Good and better” meaning good and all better than good (maximum).
HU		x	x			Maximum: Sometimes it can be given by extrapolation, but it is questionable, because of the non-linearity and low R^2 values of the models G: We focused on the definition of GEP. Since G/M boundaries are the most important we focused on these. M: Upper boundaries have been given
LT	x	x	x	x	x	
LV	x	x	x	x		B: Not possible, because modification level is too low.
NL		x	x	x	x	G: GEP
NO		x	x			Not developed specific class boundaries for ecological potential. To achieve GEP a minimum of biological and hydromorphological conditions have to be present (functional aquatic ecosystem). These conditions are included in the national guidance. Moderate, poor and bad potential are based on expert judgement relating to the extent of measures to be taken in the water body. Dry rivers are typically at bad potential
PL	x	x	x	x	x	Maximum: (Good status)
PT *	x	x	x	x	x	
RO	x	x	x			
SE	x	x	x	x	x	
SUM	**10**	**17**	**16**	**13**	**12**	

* no case study provided

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

Table 19 Interpretation of „slight changes“

	Q12,7 Approach on interpretation and application of “slight changes” in the values of BQEs as compared to the values found at MEP
AT	We consider all effects that could change EQR values or Metric values not to be minor, for macrophytes a draft adapted assessment scheme is available
CY	GEP derivation: For the boundary setting procedure, two parallel approaches were applied, one based on the response of each metric throughout the trophic gradient and the other based on a linear approximation using both ends (reference and maximum values) of each metric of the NMASRP index. The GEP boundaries were established by calculating the mean between the two methods. The metrics were chlorophyll-a, biovolume, IGA index and biovolume of cyanobacteria. The four metrics are then combined into the NMASRP index by calculating the arithmetic average of the metrics' normalized EQRs. MEP derivation: Phytoplankton data from reservoirs at MEP were collected and biological metrics determined from these data. The MEP for each metric was the mean of the values (reservoir-years) of this metric in all the MEP sites. "Slight changes" would be the difference between the outcomes of the two processes.
CZ	The maximum potential values for individual metrics were determined. GEP was determined as the EQR value (= 0.75). In addition, use of expert estimation.
DE *	Complete gradient divided into 5 classes (similar as for NWB classification); based on extensive monitoring data
EL	The detailed description is given in Annex D1 of the JRC report (de Hoyos et al. 2014). Moreover, a description of phytoplankton biological communities interpreting "slight changes" is given in the Greek National Report on the application of NMASRP (accepted by ECOSTAT) and by Pahissa et al. (2015) (Benefits and limitations of an intercalibration of phytoplankton assessment methods based on the Mediterranean GIG reservoir experience).
FI	The target is GEP. It is assessed using MEP, which is used as "reference condition" for the respective HMWB. In GEP there are only slight changes in BQE compared to MEP. The estimation for lakes is done roughly using expert judgement for all BQE's. In the case of our selected HMWB 'Kemijärvi', by excluding measures with minor impact, the overall difference in the effect of MEP-measures to GEP-measures is minor.
FR	MEP is not defined in the national method.
HR	5-level scale for all BQEs was developed and correlated with pressures.
HU	We applied Alternative Prague Approach.
IT *	*[No case study / no answer to this question]*
LV	Based on expert judgement
LT	*[no answer to this question]*
NL	No
PL	The “slight changes” depend on the level of modification. Mathematically it cannot be equal to or worse than the moderate ecological status boundaries. On average GEP = GES * 0.91
PT *	The Good-Moderate boundaries were set as percentiles of sample values for each metric included in the index NMARSP
RO	A minor modification of biological elements from MEP was taken into account
SE	Expert judgement

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

Table 20 Overview for which BQE, conditions for GEP have been derived for the selected HMWB (Q12,5)

	Benthic inverte-brates	Fish fauna	Macro-phytes	Phyto-benthos	Phyto-plankton	Notes
AT		x	x		x	*Benthic invertebrates:* not yet evaluated, method for benthic invertebrates was only developed recently *Fish:* original natural type *Phytobenthos:* not relevant *Phytoplankton:* original natural type
CY					x	
CZ		x	x		x	
EL					x	
FI	x	x	x			*Benthic invertebrates:* Evaluated by expert judgement for all BQE's via the change in the status of the respective BQE.
FR					x	
HR	x	x	x	x	x	*Macrophytes:* But not in lakes where water level oscillations are too high so that macrophyte community cannot develop in the littoral zone because it is shifting too often and too much. *Phytoplankton:* But not in lakes with low residence time where phytoplankton community cannot develop.
HU	x	x	x	x	x	
IT *				x	x	
LT	x	x	x	x	x	
LV	x					
NL	x	x	x		x	*Phytobenthos:* The NLs does not have an assessment method for Phytobenthos for lakes
PL		x	x	x	x	*Benthic invertebrates:* It may be subject to changes
PT *					x	*Phytoplankton:* Both MEP and GEP were covered during the development of the assessment method for phytoplankton, so the answer stated in Q11,1 also applies here
RO		x	x		x	*Phytobenthos:* not applicable
SE		x				
SUM	**5**	**9**	**8**	**4**	**12**	

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

Box 3 Examples of country approaches for deriving BQE conditions for GEP

The Netherlands

BQE conditions are calculated with the model WFD-Explorer, after having defined all feasible measures to obtain as high as possible ecological status. GEP is expressed on the metric of the most comparable lake type. For phytoplankton in more than 90% of the cases GEP equals GES, as hymo effects on this element are lacking.

Poland

The rules for the calculations for the lower GEP limit are specified by the following formula: $GEP = GES - [25/sum_{Ind} * (GES - MES)]$

where:

- sum_{Ind}: sum of points from the HYMO multimetrics index used for the HMWB designation (25 is the threshold: over 25 the lake is preliminary designed has HMWB)
- MES: moderate ecological status

7.2 Step G. Derivation of supporting quality element conditions for GEP

7.2.1 Introduction to step

The derivation of supporting quality elements (SQE) for GEP entails hydromorphological conditions and physico-chemical conditions. The hydromorphological conditions have to be consistent with the biological values set for GEP. For physico-chemical conditions, the same values should be met as for good ecological status of the original natural water body type, except if the parameter is impacted by the hydromorphological alteration having led to HMWB designation (e.g. changed water temperature due to hydropeaking).

7.2.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- The majority of countries (16 of 19) report to have an equivalent to step G and only three countries do not derive supporting quality element conditions for GEP.
- In one quarter of the countries that provided a HMWB case study (4 of 16), the hymo quality element conditions for GEP have been derived based only on the effects from the assumed implementation of GEP mitigation measures (step H) on hymo quality elements, excluding those delivering only “slight changes” to biological conditions. One country has derived SQE conditions for GEP only following step F (reference approach route), and two stated to use both ways (from step F of reference approach *and* from step H of measures approach). In the largest number of countries (9 of 16), hymo QE are not considered or the method to derive their conditions at GEP is under development.
- Ecological functioning as such was considered in almost two-thirds of the HMWB examples when deriving hymo conditions for GEP but only five countries (AT, ES, FI, NO, RO) explicitly took into account the need to ensure close to best approximation of ecological continuum.
- In more than half of the HMWB examples (10), hymo conditions derived for MEP (step C) and the difference between BQE conditions for MEP and GEP (steps E-F) were considered to derive hymo conditions for GEP. Hymo QE were not considered by some Mediterranean countries (CY, EL) which lay their focus on phytoplankton. Also, PT stated that the hymo conditions were “not applicable” for their HMWB for the 2nd RBMP.

- In about one third of the countries that provided a HMWB case study for the intercomparison (6 of 16), it was confirmed that physicochemical quality element conditions for GEP corresponded to the values for GES of the original natural lake type (if available). In almost the same number of countries (5), the physicochemical quality element conditions for GEP did not correspond to one or more parameters which are impacted by the physical modifications of the HMWB.

Box 4 Examples of country approaches

Greece

The approach to derive supporting physico-chemical conditions, and in particular total phosphorus values, will follow the guidance of the JRC report "Best practice for establishing nutrient" concentrations to support good ecological status" and the relevant toolbox. This is part of an on-going project and boundaries have not been defined yet.

The Netherlands

Physicochemical quality element conditions for GEP of the selected HMWB correspond to the values for good ecological status of the original natural lake type (or better if the current conditions or expected conditions after measures are better than GES, e.g. phosphorus lower than GES).

7.3 Step H. Identification of mitigation measures for GEP

7.3.1 Introduction

In this step, the mitigation measures for reaching GEP are identified. Depending on approach taken by the countries (i.e. reference vs mitigation measures approaches), the method for identifying measures for GEP may differ. According to the reference approach, the mitigation measures within GEP are those needed to achieve the derived biological conditions and conditions for the supporting quality elements for GEP. Following the mitigation measures approach, mitigation measures for GEP are obtained after removing, from the set of mitigation measures identified for MEP, any measures which only lead to slight changes in biological conditions (alone or in combination). Conditions for supporting quality elements and BQEs are then derived.

7.3.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- Most countries (15 of 19) indicate having an equivalent step to identify mitigation measures for GEP in their methods.
- Similar to the methods reported for rivers, the basis for selecting GEP measures varies between the case studies used for the questionnaire (
-
- Table 21): Six countries used the mitigation measures for MEP, all of them following a mitigation measures or combined approach. Only three countries used the derived biological conditions and conditions for supporting quality elements for GEP (2 using the reference approach, 1 using a combination). One country (RO) considered both the list of mitigation measures identified for MEP and the derived conditions for BQEs and SQEs for GEP. Three countries have identified measures based on other criteria, while five countries did not provide an answer.

Table 21 Basis for identifying the mitigation measures for GEP

Q14,2 Mitigation measures for GEP for the selected HMWB have been identified based on:				
	Reference approach	**Mitigation measures approach**	**Combination**	**Different approach**
the derived biological conditions and conditions for supporting quality elements for GEP (step F and G of reference approach route)	CZ, LV	–	RO	–
the set of mitigation measures identified for MEP (step B of mitigation measures approach route)	–	FI, HU, SE	AT, PL, RO	–
Other	–	NL	–	ES, FR

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

- The most **common mitigation measure** identified for GEP is management of reservoir/lake level (6 countries). Two countries provided an explanation and noted the goal to reduce risk of freezing at low water level (FI) and to reduce external nutrient supply (SE). Fewer countries identified as measures the creation of secondary habitats (4) and the enhancement of shore/shallow habitats for spawning (3). Fish migration aids / improvement of connectivity to riverine habitats/tributaries/other lakes have been identified by four countries. AT did not identify this measure as possible mitigation measure but stated the benefit of continuity was still under discussion. No measures were identified by four countries, among these CY and EL which focus their classification of GEP on phytoplankton and together with HR stated that they do not have a step equivalent to step H. In Cyprus reservoirs, the targeted BQE is phytoplankton and the impacting pressure is eutrophication. There are no relevant mitigation measures in the mitigation measures library and the required measures to reach GEP are taken in the upstream catchment to reduce nutrient loads entering the reservoir. Also, PL stated that none of the measures identified has been defined as applicable at the step of the restoration measures test.
- Several countries (AT, FI, HU, LV, RO) indicated that the lists of **mitigation measures to define MEP and GEP** were different because certain measures were not likely to be necessary for GEP or they were the same but the GEP measures (or some of them) significantly differed in intensity from the MEP. One country (SE) stated that in the case study provided the list of GEP measures was exactly the same as for MEP. Among the remaining countries which provided an answer to this question, two did not have a measure list for MEP at all (CZ, FR), one country could not apply any measure for GEP and MEP (PL). NL stated that "all potential mitigation measures [were] evaluated for GEP, measures with significant adverse effects on use or wider environment were excluded". Strictly speaking, this step should have been considered for MEP already. However, NL does not explicitly derive MEP, but directly derives GEP based on the WFD Art. 4.3 criteria for excluding restoration measures. Uncertainties remain in two countries[8].

[8] NO's answer to Q14,4 is "other" although the measures list for GEP (Q8,2) and MEP (Q14,3) are the same and includes only 1 measure (fish migration aids). The country also states that "minimum flow in this …

- Among the countries with different lists, two identified continuity or migration as a measure with only slight improvement to ecology. For the majority of countries, a comparison is not possible because one of the steps was not implemented in their method.
- Almost half of the countries (7 of 16) indicated that the mitigation measures for defining GEP covered the **whole water body**. Only one or two countries selected a **proportion of the water body**. Three selected either all or a proportion of potentially suitable locations for habitat enhancement as spatial extent for the selected GEP measures. FR and PL selected the option “other”, since none of the other options applied to the measure implemented (floating islands; FR) or no measure at all was applicable (PL).
- Table 22 summarises the answers to different questions of mitigation measures for MEP and GEP. Summing up the steps B1, B2, B3 and H, the table lists all measures selected in the following questions:

  Q6,2 Which potential groups of mitigation measures were identified as appropriate for improving the conditions of the selected HMWB? (Step B1)

  Q6,4 For each group of potential mitigation measures for MEP: What concrete practical measures did you consider for the MEP of the selected HMWB? (Step B1)

  Q7,6 For the selected HMWB: Were any of the mitigation measures identified in Step B1 excluded from MEP, because they have SAEOU or wider environment? (Step B2)

  Q8,2 Which of the mitigation measures were finally selected as the most ecologically beneficial (combination of) measures for the MEP of the selected HMWB? (Step B3)

  Q14,3 Which are the specific practical mitigation measures selected for GEP of the selected HMWB? (Step H)

  The aim of Table 22 is not to identify specific measures and assess their feasibility but to highlight possible inconsistencies in the definition and stepwise exclusion of mitigation measures. Such inconsistencies may have arisen from the fact that three of these questions (Q6,2, Q6,4 and Q14,3) specifically asked for a pre-defined list of nine measures (plus “other”), while Q7,6 and Q8,2 only generally asked for mitigation measures. They might also be due to problems of understanding the logic of measures steps.

  The table does not include CY and HR which stated that they did not have a step equivalent to step B1, step B3 and step H. ES has an equivalent step which is under development. In the ongoing development of the method, ES has been able to identify mitigation measures for the case study. EL stated that it had an equivalent step but provided no answers and is thus also not included in this summarising table.

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regulation would further improve conditions. This has not yet been taken into account by the competent authority and is so far not regarded as a realistic/feasible measure according to Norwegian law.”

SE stated that “the list of GEP measures is exactly the same as for MEP in this case”, which implies it might be different in other cases.

Table 22 Comparison on the selection of mitigation measures at different steps.

	equ		Enhance shore habitats	Create second. habitats	Remove shore fixation	Mgmt water level	Mgmt sediment	Mgmt lake use / protected areas	Fisheries mgmt	Fish migration aids	Mitigation PhysChem	Other	
			1	2	3	4	5	6	7	8	9	10	11
AT	+	B1 Appropriate measures (6,2)			x	x				x			
	+	B1 Concrete measures (6,4)			x	x				x			
	+	B2 SAEOU (7,6)	No measure excluded										
	+	B3 Finally selected for MEP (8,2)			x	x				x	control of turbid water		
comb	+	H Measures for GEP (14,3)			x	x				-			
CZ	-	B1 Appropriate measures (6,2)											
	-	B1 Concrete measures (6,4)											
	-	B2 SAEOU (7,6)	Mitigation measures having apparent SAEOU are not proposed.										
	-	B3 Finally selected for MEP (8,2)	In general we specified possible mitigation measures										
Ref	+	H Measures for GEP (14,3)		x	x			x		x			
ES	+	B1 Appropriate measures (6,2)		x	x	x		x				x	
	+	B1 Concrete measures (6,4)		x	x	x		x				x	
	+	B2 SAEOU (7,6)	No measure excluded										
	+	B3 Finally selected for MEP (8,2)		x	x	x		x				x	
diff	+	H Measures for GEP (14,3)		x	x	x		x				x	
FI	+	B1 Appropriate measures (6,2)	x	x		x						x	
	+	B1 Concrete measures (6,4)	x	x		x			x	x		(x)	
	+	B2 SAEOU (7,6)											removal of dam
	+	B3 Finally selected for MEP (8,2)	x	x		x			x	x		x	
MM	+	H Measures for GEP (14,3)	x			x			x				
FR	-	B1 Appropriate measures (6,2)	MEP is not defined in the current national method										
	-	B1 Concrete measures (6,4)	MEP is not defined in the current national method										
	+	B2 SAEOU (7,6)				-							
	+	B3 Finally selected for MEP (8,2)	x	x									shore vegetation
diff	+	H Measures for GEP (14,3)	x	x								min.flow down-stream	
HU	+	B1 Appropriate measures (6,2)	x	x		x	x	x	x	x			
	+	B1 Concrete measures (6,4)	x	x		x	x	x	x	x			
	+	B2 SAEOU (7,6)	under development										
	+	B3 Finally selected for MEP (8,2)	Most of the measures …				x	… have already been taken					
MM	+	H Measures for GEP (14,3)					x				x		
LT	+	B1 Appropriate measures (6,2)		x		x							
	+	B1 Concrete measures (6,4)											
	+	B2 SAEOU (7,6)	Measures reducing benefits for electricity generation, flood protection and recreation.										
	+	B3 Finally selected for MEP (8,2)											
comb	+	H Measures for GEP (14,3)											

	equ		1 Enhance shore habitats	2 Create second. habitats	3 Remove shore fixation	4 Mgmt water level	5 Mgmt sediment	6 Mgmt lake use / protected areas	7 Fisheries mgmt	8 Fish migration aids	9 Mitigation PhysChem	10 Other	11
LV	+	B1 Appropriate measures (6,2)		x		x							
	+	B1 Concrete measures (6,4)		x		x							
	+	B2 SAEOU (7,6)			-								removal of dam
	+	B3 Finally selected for MEP (8,2)		x									
ref	+	H Measures for GEP (14,3)		x		x							
NL	+	B1 Appropriate measures (6,2)				x			x		x	removal flood protection	
	+	B1 Concrete measures (6,4)	The NLs does not explicitly derive MEPs as such (see question 1.11)										
	+	B2 SAEOU (7,6)	The NLs does not explicitly derive MEPs as such (see question 1.11)										
	+	B3 Finally selected for MEP (8,2)	The NLs does not explicitly derive MEPs as such (see question 1.11)										
MM	+	H Measures for GEP (14,3)				x			x		x		
NO	+	B1 Appropriate measures (6,2)				x				x		x	
	+	B1 Concrete measures (6,4)				(x)				(x)			
	+	B2 SAEOU (7,6)	No measure excluded (Management of water level is yet to be considered by the Competent Authority)										
	+	B3 Finally selected for MEP (8,2)								x			
MM	+	H Measures for GEP (14,3)								x			
PL	+	B1 Appropriate measures (6,2)			x							removal touristic infrastr.	
	+	B1 Concrete measures (6,4)			x								
	+	B2 SAEOU (7,6)			-							-	
	+	B3 Finally selected for MEP (8,2)	None of the measures identified has been defined as applicable										
comb	+	H Measures for GEP (14,3)	None of the measures identified has been defined as applicable										
RO	+	B1 Appropriate measures (6,2)				x	x			x			
	+	B1 Concrete measures (6,4)				x	x			x			
	+	B2 SAEOU (7,6)	Measures with SAEOU have been excluded from the very begining										
	+	B3 Finally selected for MEP (8,2)					(x)	Migration + sediment transport		(x)			
comb	+	H Measures for GEP (14,3)				x	x			x			
SE	+	B1 Appropriate measures (6,2)	x		x		x			x		x	
	+	B1 Concrete measures (6,4)	x		x		x			x			
	+	B2 SAEOU (7,6)	No measure excluded										
	+	B3 Finally selected for MEP (8,2)	x		x		x			x			
MM	+	H Measures for GEP (14,3)	x				x			x			

equ … statement whether the countries have a step equivalent to the corresponding step in the CIS Guidance.

Ref / MM / comb / diff … answer to Q1,4: Ref = reference approach, MM = mitigation measures approach, comb = combination, diff = different approach.

Last column (column 11): Measure mentioned in step B2 (measures with SAEOU) but not in previous steps

Note: Status of the methods as of autumn 2020

8 Implementation of measures to achieve GEP

The implementation of the measures to reach the objective for the HMWB (defined GEP) should be distinguished from the identification of measures for defining the GEP objective. These are two different processes related to measures for GEP, though both are closely interconnected. A distinction between these two processes is crucial for the management of HMWBs and for ensuring a more transparent and common understanding of whether GEP can be reached or not.

The identification and planning of measures to mitigate the ecological effects of hydromorphological modifications (i.e. for defining and thereby predicting GEP) takes place prior to updating RBMPs, as described in the previous sections. The final decision on whether it will be possible to implement all measures, out of those which are needed to achieve GEP, takes place for single water bodies and is an individual River Basin Management decision in the context of the programme of measures (objective setting in the RBMP). If several of the measures for GEP are de-selected for implementation at this stage because they are infeasible or disproportionally expensive, and the possibility of achieving GEP is compromised, an exemption (Article 4.5) from GEP should be considered.

8.1 Monitoring to assess whether GEP is being achieved

8.1.1 Introduction to step

Monitoring should be used to estimate the current ecological potential class of a HMWB. The main decisive elements are the biological quality elements that determine the class of ecological potential. These are supported by hydromorphological and physico-chemical quality elements. If a proper assessment based on biological quality elements is not yet possible (e.g. due to a lack of hydromorphology-sensitive methods), monitoring of hydromorphological (and physico-chemical) quality elements can be used as a proxy. Monitoring of the ecological condition of the HMWB is also used to assess the effects of any (existing) mitigation measures already in place and the need for further mitigation measures to achieve GEP. In case of lack of existing monitoring, appropriate site-specific monitoring needs to be set up in order to assess whether the expected mitigation from the measures already in place has been delivered and whether GEP is being achieved.

8.1.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- Most countries (15 of 19) report to use monitoring to assess whether GEP is being achieved and thus assess the need for further mitigation measures. Four countries report not to use monitoring to assess GEP achievement but three of them provided an answer to the Q15,2 on which method were used (third bullet point).
- In three quarters of the selected HMWB examples, the ecological condition has been monitored to assess whether the expected mitigation from existing measures has been delivered and whether GEP is being achieved. In the remaining quarter of the HMWB examples, this was not possible to do for different reasons illustrated in the tables below.
- Concerning the monitoring and assessment **methods** that were used to classify the current ecological potential, for almost two-thirds (10 of 16) of the HMWB examples, monitoring and assessment of BQEs with hydromorphology-sensitive methods was used. In the same number of case studies, monitoring and assessment of BQEs without hymo-sensitive methods were used. In half of the case studies (8 of 16), monitoring and assessment methods for hymo (and physico-chemical elements) were used, but in all cases in combination with BQE monitoring. Inconsistencies occurred in three of the countries that stated that monitoring was not possible but still provided information on the kind of monitoring (HR, LT, PL).
- Less countries have reported using hydromorphology-sensitive methods for assessing BQE for the lakes/reservoirs compared to the river category, and some countries who had reported using it for rivers were not for lakes/reservoirs.

- In terms of the **classification outcome** of the current ecological potential, all countries could classify the ecological potential in their selected study including those four which stated not to have monitoring. In one country, the case study includes several water bodies which differ in their classification. Five countries have selected HMWB examples which they report to be currently at GEP. In 11 case studies, the GEP is not achieved.

Unclear issues / gaps

- None

Table 23 Monitoring and assessment method for classifying ecological potential

Q15,2 What kind of monitoring and assessment methods were used to classify the current ecological potential?		
Methods	**Countries**	**Explanations**
Monitoring and assessment of **BQEs with hydromorphology-sensitive methods**	AT, CZ, ES, FI, FR, LT, LV, NL, NO, PL	CZ: BQE Fish was assessed only for the 2nd RBMP CY: Phytoplankton in reservoirs is not hydromorphology-sensitive (it is assessed in the pelagic zone) ES: Based on the document "Spanish system for the assessment of the ecological status of lake water bodies: pressure level estimation and response of metrics" FI: Aquatic macrophytes, littoral invertebrates and fish is monitored FR: Macroinvertebrates and fish fauna NO: Frequent monitoring of fish in the lake: Standard net-fishing in the lake and electro-fishing in tributaries. Hydroacoustic in the lake.
Monitoring and assessment of **BQEs without hydromorphology-sensitive methods**	AT, CY, CZ, EL, FR, HR, HU, IT[9], LT, LV, RO	CZ: BQE Phytoplankton CY: Phytoplankton in reservoirs is not hydromorphology-sensitive (it is assessed in the pelagic zone) FR: Phytoplankton HR: Partially sensitive as explained before HU: BQE methods were primarily developed to measure the impact of organic and inorganic pollution. Specific biological methods for hymo alterations were not developed. However there are some BQE which indicate the undesirable hymo conditions. IT[6]: Phytoplankton and phytobenthos RO: Available monitoring data on fish communities and macrophytes
Monitoring and assessment of **hydromorphological (and physico-chemical) quality elements**	AT, CY, CZ, FR, HR, IT[6], LV, NL, RO	CZ: Only physico-chemical quality elements are assessed (not hydromorphological elements) IT[6]: National mitigation measures list NL: Several hydromorphological parameters are listed during monitoring of BQEs. Monitoring of BQEs also accounts for hy-

[9] reported by Italy but without case study

		dromorphological heterogeneity at monitoring points, for example sampling all present habitat-types at a monitoring point for invertebrates.

Note: Table shows information on countries that provided a response on this issue in the questionnaire. Countries missing from table did not provide a response.

Note: Status of the methods as of autumn 2020

8.2 Are there GEP measures that are disproportionally expensive or infeasible?

8.2.1 Introduction to step

River Basin Authorities may be of the opinion that some of the GEP measures identified in step H are disproportionately expensive (e.g. because the investment costs of measures are high) or infeasible. If this is the case, it needs to be checked if it is still possible to achieve GEP.

If one or more of the selected GEP measures have been excluded according to cost considerations or infeasibility, it has to be checked whether the remaining measures are still sufficient to achieve the biological conditions at GEP. If this is not the case, a review and possibly re-design of the measures will be needed to avoid the need to use exemptions: for example, selecting another combination/intensity of measures may deliver the desired ecological improvement.

8.2.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- Two-third of the countries (13 of 19) report to have an equivalent step in their approach. One-third of the countries indicated not having this step.
- Almost half of the countries assess disproportionality or infeasibility of measures when mitigation measures are to be implemented within the programme of measures to achieve GEP. Five countries do not assess disproportionality or infeasibility and in four countries it is unclear. Among those five countries that do not assess disproportionality or infeasibility, two report that this was done at an earlier stage, while one country will do this later. One country (PL) reported both options but added that economic elements are taking into account to assess if the measures will have SAEOU.
- Only two countries report GEP measures that were demonstrated to be disproportionally expensive in the selected HMWB examples, and only one reports GEP measures that were technically infeasible: Management of reservoir/lake level (LV both questions) and Remove hydropower (LT). Several countries indicated that disproportionality or infeasibility were still unclear due to on-going assessments and methodological development.
- Five of 16 countries were able to assess the impact of disproportionate cost analysis on the achievement of GEP, i.e. they also assessed whether the remaining measures were sufficient to achieve GEP. For the remaining countries it was unclear (4) and in one case the measures were not sufficient to achieve GEP. Six countries could not provide an answer.

Unclear issues / gaps

- In some cases, costs were included already in previous steps. CZ stated that measures with disproportionate costs are not in the mitigation measures library. LV reported that it includes this step but mentioned earlier that a measure (fish-way) was discarded for financial reasons.
- Only one country (AT) explicitly connected disproportionately expensive or infeasible costs with the option of an exemption.

8.3 Implement GEP measures and monitor effects on BQEs and supporting quality elements

8.3.1 Introduction to step

All GEP measures that can be applied and are assumed to be sufficient to achieve GEP biological conditions are then implemented. The effects of the implemented GEP measures on BQEs and supporting quality elements should subsequently be monitored and the ecological potential of the water body should be classified accordingly.

If GEP is achieved based on the monitoring results, no further mitigation measures are needed.

If monitoring results indicate that the mitigation measures have such an effect on quality elements that the water body reaches good ecological status, the water body cannot be considered as heavily modified and should be re-designated as a natural water body with good status as its environmental objective. If the monitoring indicates that the mitigation measures are not sufficient to achieve good status, the designation of the water body as HMWB remains valid and the defined GEP remains as its environmental objective.

If monitoring shows that expected GEP conditions are not achieved after the implementation of all measures, then the reasons (see above) for this need to be clarified, and it is possible that the combination or intensity of measures will need to be refined. Therefore, the implementation of measures to achieve GEP should be seen as an iterative process, starting with typical measures normally expected to mitigate a certain hydromorphological pressure-impact (see the European mitigation measure library which is a supporting tool to this document) that are known to be effective in most situations. These can be subject to future refinement or even the implementation of additional measures later on, taking into account the monitoring results.

8.3.2 Key findings of the intercomparison

Summary of common aspects & differences in interpretation and implementation of step

- The majority of countries (15 of 19) report to monitor the effects of implemented GEP measures on BQEs and supporting quality elements, with the exception of four countries.
- Among those countries that have identified measures for achieving GEP, six countries report that all (FI, NL, NO, RO) or some (AT, CZ) GEP measures have been implemented or are in planning to be implemented before 2027. CY mentioned measures which are not listed in previous sections of the questionnaire, and two countries have not implemented any measure yet as part of the RBMP programme of measures (FR, LV).
- For about half of the countries with HMWB case studies (7 of 16) some **evidence from monitoring** is already collected on the success of mitigation measures, one of them (CY) reported that no major success of the measures was visible so far. Three countries have not reported any evidence, partly because the measures have not yet been implemented, and one country (PL) has not implemented any measure. No answer was provided by the remaining 5 countries.
- In four countries there are several **lessons learned** already, e.g. the necessity to focus on sensitive BQEs (FI) or problems with measures such as floating islands during intensive touristic activity in summer (FR). One country reported about no lessons learned, while 10 countries did not provide an answer to this question.

Unclear issues / gaps

- The answers of several countries are not sufficiently clear to allow a comparison across Europe. At present the link between the monitoring programmes – which exist in most countries in one way or another – and the evaluation of improvements or even GEP achievement seems rather poor.

9 Lessons learned by countries on their methods

9.1 Lessons learned from methods application

Most countries provided statements on lessons learned from methods application, while four countries did not (HR, IT, LT, LV). However, the statements hardly allow general conclusions to be drawn.

- Some countries stated that the methods were basically applicable (AT), well applicable (CY), can be adequately assessed (PT) but require a lot of information and expertise (AT).
- AT and PL identified difficulties to apply the method to a larger group of HWMB but stressed the importance to have experience of individual cases (AT) and local knowledge (PL).
- Problems and challenges to connect impacts, responses and measures were highlighted by several countries:
    - AT "difficult estimation of ecological effects"
    - CZ "implementation of mitigation measures in practice is a problem"
    - FR "feedback from mitigation measures is essential"
    - NO "ecological effects from measures have been even more in focus than previously"
    - RO "strengthening the link/knowledge between biology-hydromorphology is of high importance / relevance")
- FR and RO stressed the importance of (long-term) monitoring data to assess the effect of mitigation measures.
- FI stated that biological indicators monitored do not support the mitigation measures approach in rivers, while they work more properly in lakes.

9.2 Strengths and weaknesses of methods

Countries were also asked to indicate key strengths and weaknesses of their methods for ecological potential definition, which are summarised below. No statement was made by two countries (DE, LT).

Strengths

- Several countries stressed that their approach was transparent and easy (AT, HU), easily understandable (CY), rough and applicable as expert judgment for all HMWB (FI). The use of expert judgement was mentioned also by NO. FR highlighted that the method was applied in the whole country (national level) guaranteeing homogeneity. In the NL, the method is widely accepted and applied too. The statement from IT underpins the importance to provide an understandable method to river authorities and the decision makers.
- Regarding the sensitivity of the methods, some countries focus on eutrophication and other forms of pollution (CY, CZ, EL, HR, ES; mainly reservoirs) and highlight that the classification methods have been intercalibrated. The correlation between environmental variables and ecological quality (expressed as EQRs) is considered a strength of the method in the NL. Also, PT points out the coherence between pressures and results, while the sensitivity to hydro-morphological pressures is covered by the classification methods applied in ES. The integration of mitigation measures in view of the environmental objectives in the upstream and downstream water bodies is noted by one country (RO).

Weaknesses

Most countries also mentioned weaknesses of their methods. Three countries did not give any answer (DE, IT, RO) and only one country stated there were no weaknesses (CY).

- Difficulties in defining general criteria for significant impacts on the use or for determining the extent of measures were identified by a few countries (AT, FR, NL). FI addressed the challenge to open the method for stakeholders due to the complexity of the method.

- The lack of data and/or the need to have sufficient monitoring data was noted by three countries (CZ, HU, NO), stressing also that monitoring is time-consuming and costly (CZ). Other countries mentioned the lack of data on the hydro-morphological characterisation (ES), the lack of a classification method on the hydro-morphological conditions (NO), and weak statistical correlation between a hydro-morphological index and BQE (PL). Other countries see a weakness in too strong a focus on eutrophication (EL, HR) and limited sensitivity to physical alterations (LV). The fact that the assessment system for phytoplankton is quite recent for two out of three national reservoir types was mentioned by PT.
- Three countries identified weaknesses in the definition of (national) mitigation measures (ES, FR) and in uncertainties to forecast the response on measures (NL).

9.3 Needs for further guidance

Finally, countries were asked to indicate which steps of the approach on ecological potential definition, that is proposed in CIS Guidance no. 37, they would like to have more practical guidance and examples on.

- Nine countries (AT, CZ, DE, EL, HR, IT, LT, PL, PT) did not give an answer to this question, one country (CY) stated that for the purpose of the method described in this questionnaire no further guidance was needed.
- Specific steps were mentioned by three countries only (ES: steps B1, B2, E, F, H; LV: step B, SE: steps E, F, H and in addition monitoring and ecological continuum), while five additional countries provided an explanatory text on further guidance needs. More explanations were asked on significant adverse effects (NL), ecological continuum (FI), generally the Prague approach (HU), the link between impacts of hydromorphological alteration on the biological elements (FR, RO)

10 Key conclusions on the intercomparison of the definition of ecological potential for Lakes/Reservoirs

Generally, many answers in the lakes/reservoirs questionnaires of the countries on the intercomparison of ecological potential were similar to those in the rivers questionnaires and revealed comparable approaches in the definition of MEP and GEP in the two different water categories. However, it seems that several countries have put more emphasis on defining ecological potential for rivers than for lakes with regard to the level of detail and comprehensiveness in the method descriptions. The methods developed for heavily modified lakes/reservoirs seem less developed than those for heavily modified rivers.

Some answers in the lakes/reservoirs questionnaires often raised more questions rather than clearly describing the countries' approaches, which could be due to the fact that it might be easier to define mitigation measures for rivers than at least for some types of heavily modified lakes/reservoirs. The possibilities to define measures in reservoirs with strong water level fluctuations may be limited, because possible measures can very quickly (and significantly) affect the use. There may be cases where there is no real intersection between measures without significant adverse effects on use (SAEOU) and measures which have a significant and measurable positive effect on BQEs. The example of Poland (PL) which stated that there were no applicable measures at all reflects this. The problem of finding effective mitigation measures without SAEOU may arise especially in artificial lakes and reservoirs which were rivers originally, in other words: in systems which do not exist naturally.

Another issue that deserves attention is the situation of reservoirs where phytoplankton is used as "sensitive" BQE and measures are defined only/mainly against eutrophication rather than to mitigate the physical alterations, which were the reason to designate a water body as heavily modified. Such case studies were provided by countries with finalised intercalibration exercise on Mediterranean reservoirs (e.g. CY, EL, ES[10]), which may have given the impression that the 'ecological potential topic' for reservoirs has already been sufficiently addressed. The afore-mentioned limitations to define ecologically effective mitigation measures without SAEOU in reservoirs may be another reason for the discrepancy between the approach to assess the ecological status of a reservoir based on phytoplankton versus the ecological potential as required in the CIS Guidance no. 37.

The limitations in reservoirs (when compared to rivers) are obvious also concerning the issue of ecological continuum. According to the CIS Guidance no. 37, MEP requires that best approximation of ecological continuum is ensured, while a water body can only be at GEP if a condition close to best approximation is achieved. Only five countries considered continuum when selecting mitigation measures (among them one country stating that the effect of fish migration aids was under discussion). Ecological continuum seems to be considered in some lakes/reservoirs as less crucial and not as prerequisite for ecological functioning as is the case for the river ecosystems.

Concluding, there is still room for improvement in the understanding of the CIS Guidance no. 37 for heavily modified lakes and reservoirs. A follow-up activity could focus on the relationship of physical alterations (as anthropogenic impacts which cause the designation of a water body as heavily modified) and secondary impacts such as eutrophication. The different views on relevant BQEs and their sensitivity to anthropogenic impacts should be discussed. It is recommended also to review the European mitigation measures library for HMWB to identify more lake- or reservoir-specific measures, resulting from the assumption that measures may be useful in dynamic ecosystems such as rivers (e.g. structures along the shore) but could be less feasible and effective in less dynamic ecosystems such as lakes.

[10] Besides these three countries, also FR, IT, PT and RO participated in the intercalibration exercise of Mediteranean reservoirs. Two of them (IT, PT) did not provide a case study.

11 References

1. Guidance Document no. 37, Steps for defining and assessing ecological potential for improving comparability of Heavily Modified Water Bodies, 2019.
2. Guidance Document no. 37 - Mitigation Measures Library, 2019.
3. Pollard, P. 2011. Concept paper Good ecological potential – Recommendations on assessing and improving comparability. Final version endorsed by Water Directors at their meeting on 8-9 December 2011 in Warsaw.
4. Working Group ECOSTAT report on Common understanding of using mitigation measures for reaching Good Ecological Potential for heavily modified water bodies. Part 1: Impacted by water storage
5. WG ECOSTAT report on common understanding of using mitigation measures for reaching Good Ecological Potential for heavily modified water bodies. Part 2: Impacted by flood protection structures
6. WG ECOSTAT report on common understanding of using mitigation measures for reaching Good Ecological Potential for heavily modified water bodies. Part 3: Impacted by drainage schemes
7. Workshop Report, Workshop on mitigation measures and GEP for Inland Navigation water use. 29th – 30th June 2017, Brussels

Annex 1: Key references and sources to the methods reported

The following table provides links to the documents that describe the country methods for HMWB designation and ecological potential definition. Although IS did not submit a complete questionnaire, it is included here with links to a preliminary list of HMWB.

Five countries which submitted a complete questionnaire (LT, LV, NO, PT, RO) did not provide links to the documents.

Two countries did not provide links but sent documents via mail (HR, PL).

The only document available in English is the WFD Intercalibration Report on Mediterranean lake phytoplankton ecological assessment methods (de Hoyos et al. 2014). Only one document (FI) includes an English summary.

AT	https://www.bmlrt.gv.at/wasser/wisa/ngp/ngp-2015/hintergrund/methodik/HMWB.html *[accessed 7 May 2021]* https://www.bmlrt.gv.at/wasser/wisa/ngp/ngp-2015/hintergrund/methodik/hmwb_kuenstliche.html *[accessed 7 May 2021]*
CY	http://www.moa.gov.cy/moa/WDD/wfd.nsf/all/8EB76C35352171EEC225844F002355A5/$file/6_Oristikos_prosdiorismos_HMWB_AWB_Jul_2015.pdf?openelement *[assessed 7 May 2021]* http://publications.jrc.ec.europa.eu/repository/bitstream/JRC88301/med%20phyto%20cor.pdf *[assessed 7 May 2021]*
CZ	HMWB designation: H. Prchalová: Aktualizace metodiky určení silně ovlivněných vodních útvarů. VÚV TGM, v.v.i. pro MŽP, 2019. https://heis.vuv.cz/data/webmap/datovesady/projekty/ramcovasmernicevoda/default.asp?lang=&tab=5&wmap= *[assessed 7 May 2021]* EP definition - BQE: https://www.mzp.cz/C1257458002F0DC7/cz/prehled_akceptovanych_metodik_vod/$FILE/OOV-Metodika_hodnoceni_%20ekologicky%20potencial_%20kategorie_jezero-20140301.pdf *[assessed 7 May 2021]*
DE	https://www.wasserblick.net/servlet/is/142684/RaKon-B-Arbeitspapier-VI-Seen_Stand_20200504.pdf?command=downloadContent&filename=RaKon-B-Arbeitspapier-VI-Seen_Stand_20200504.pdf *[assessed 7 May 2021]* https://www.gewaesser-bewertung.de/files/handbuch_phyto-see-index_dez2017.pdf *[assessed 7 May 2021]*
EL	Methodologies for the designation of HMWBs & AWBs as well as for the identification (criteria) of hydromorphological alterations, based on the CIS GD No.4, were developed during the 2nd planning cycle. They are both available in the following link: http://wfdver.ypeka.gr/el/management-plans-gr/methodologies-gr/ (only in Greek language). The methodology for the classification of lake water bodies, including reservoirs, is also available in the following link: http://wfdver.ypeka.gr/el/management-plans-gr/methodologies-gr/ *[assessed 7 May 2021]*
ES	Mediterranean Assessment System for Reservoirs Phytoplankton (MASRP) Med GIG technical report lakes https://publications.jrc.ec.europa.eu/repository/bitstream/JRC88301/med%20phyto%20cor.pdf *[assessed 7 May 2021]*
FI	(1) https://www.ymparisto.fi/download/noname/%7B46EB0A9F-7DE2-47DA-AEE7-C11A4DBDBBC3%7D/158922 *[assessed 7 May 2021]* – Classification of artificial waterbodies and heavily modified waterbodies during the 3rd RBMP cycle (35 pages, in Finnish); (https://helda.helsinki.fi/bitstream/handle/10138/41788/OH_7_2012.pdf *[assessed 7 May 2021]* – Aroviita, J., Mitikka, S. & Vienonen, S. (eds.) 2019. Status classification and assessment criteria of surface waters in the third river basin management cycle. Reports of Finnish Environment Institute 37, 2019. 177 pp., ISBN 978-952-11-5074-6 (PDF). In Finnish with English summary. HMWB's on Chapter 8 and Appendix 10.
FR	https://www.legifrance.gouv.fr/eli/arrete/2018/7/27/TREL1819388A/jo/texte *[assessed 7 May 2021]*
HR	Studies which define development of the EP classification system for HMWB of accumulation are available in Croatian version and can be sent by e-mail at request. (After request, two pdf were provided)
HU	https://www.vizugy.hu/vizstrategia/documents/988BF7DB-B869-46C6-9463-E9E4BFC81D2A/1_4_hatteranyag_EM_M_modszer.pdf *[assessed 7 May 2021]* The full description is still not available in English yet.
IS	HMWB designation method is in development. A preliminary list of HMWB has been proposed (only available in Icelandic). http://vatn.is/library/sida/haf-og-vatn/Mannger%c3%b0%20og%20miki%c3%b0%20breytt%20vatnshlot_LOKASk%c3%bdrsla_28.8.2020.pdf *[assessed 7 May 2021]*

IT	https://www.minambiente.it/pagina/pianificazione-e-governo-del-territorio *[assessed 7 May 2021]* To give a more direct link for interested readers, this is the right webpage path: https://www.minambiente.it/pagina/normativa-tecnica-l-identificazione-e-la-classificazione-dei-corpi-idrici-fortemente *[assessed 7 May 2021]*
LT	*[not provided]*
LV	Not yet available
NL	https://www.waterkwaliteitsportaal.nl/WKP.WebApplication/Beheer/Data/Publiek?viewName=Bronbestanden&year=2019&month=December *[assessed 7 May 2021]*
NO	HMWB designation and boundaries for GEP: http://www.vannportalen.no/globalassets/nasjonalt/dokumenter/veiledere-direktoratsgruppa/01_2014_smvf-veileder.pdf National framework for prioritizing hydropower licenses for revision: NVE (miljodirektoratet.no)
PL	*[as a mail attachment]*
PT	Details on assessment methods will be updated in the 3rd RBMP. To date, ecological potential in reservoirs has been evaluated following the assessment system described in the 2nd RBMP. That system will be updated for the next cycle
RO	The document addressing the up-dated ecological potential definition has been recently elaborated and will be publicly available in the draft of 3rd RBMP.

Annex 2: Empty questionnaire

CIS ECOSTAT

European country Questionnaire on intercomparison of Ecological Potential of HMWB

The present questionnaire on the intercomparison of ecological potential has been developed by the GEP core group of ECOSTAT and its aims are to:
- Firstly, collect information on the methods for definition and assessment of ecological potential used in the Member States for the 3rd river basin management plans (RBMPs), as a basis for understanding the different approaches used,
- Secondly, compare approaches for definition and assessment of ecological potential, which are relatively well-developed and to some extent comparable to the step-wise approach described in CIS Guidance no. 37 (https://circabc.europa.eu/ui/group/9ab5926d-bed4-4322-9aa7-9964bbe8312d/library/d1d6c347-b528-4819-aa10-6819e6b80876/details).
It is expected that the experts who fill in the questionnaire are already familiar with the new CIS Guidance no. 37 on defining and assessing ecological potential.
Please read the instructions circulated together with the questionnaire, before replying to the different questionnaire sections.

This Questionnaire B collects information on the surface water category of **Lakes as well as on Reservoirs, which were previously a river that now resembles a lake water category.** Separate questionnaires are made available for collecting information on Rivers (Questionnaire A) and on Transitional/Coastal waters (TraC) (Questionnaire C).

Disclaimer

When a water body has been designated as a HMWB, it must be given the closest comparable water category. When you choose which intercomparison questionnaire to fill in, you should do so on the basis of the water category of the water body as a HMWB, not on the basis of the category it would have if it were to be seen as a natural water body. For example, if the existing modifications to a river make it more closely resemble a lake (e.g. a large reservoir that shows typical lake ecosystem conditions like a stratification), the water body should be handled as a lake within this Lakes/Reservoirs Questionnaire. If a modified river is clearly a river ecosystem, although it is altered by storage through a dam (e.g. a large river with impoundments and a reduced flow velocity), this should be handled as a river within the Rivers Questionnaire. For cases that are somewhere in between riverine and lake ecosystem conditions (e.g. a small reservoir with a residence time of two days, a continuous flow and riverine habitat conditions) it needs to be decided whether to handle those as rivers or lakes within the relevant Questionnaire. Please explain your decision for such cases.

The questionnaire provides a common template to document the methods used for ecological potential definition and assessment in the 3rd RBMPs, using selected HMWB examples (case studies) to better illustrate the different steps. The selected examples should be HMWB that have been classified but they do not have to be fully developed ideal case studies on the definition and assessment of ecological potential. For countries with less developed methods for the 3rd RBMPs, the selected HMWB examples can be HMWB which have been classified using another preliminary approach.

Section 1 of the Questionnaire (General information on method used for definition and assessment of ecological potential) should be filled in by all countries which have designated HMWB in the specific water category.
After Section 1, two options are possible:
- If your method for ecological potential definition and assessment has one or more steps equivalent to the steps described in the CIS Guidance Document no. 37: you should fill in Sections 3 and 4 (on the context and designation of the HMWB example) and Sections 5 to 17 (on each step).
- If your method does not include any step equivalent to CIS Guidance Document no. 37: you are asked to describe your approach in Section 2 of the questionnaire.

Section 18 (Lessons learned) should be filled in by all countries.

If you can provide more than one example of classified HMWB in the same water category (e.g. two examples of HMWB lake or reservoir with focus on different physical modifications), please fill in a separate questionnaire for each example.

The GEP core group is available to provide further explanations and assistance ('Helpdesk'). In case you require further advice, please contact: eleftheria.kampa@ecologic.eu & wouter.van-de-bund@ec.europa.eu.
Please return the filled-in questionnaire by **16th November 2020** at the latest to: eleftheria.kampa@ecologic.eu

Questionnaire on intercomparison of Ecological Potential of HMWB
Questionnaire B "Lakes/Reservoirs"

For more in formation refer to the "Read Me" section

0,0	Country	
0,1	Contact Person	

1 - General information on method used for GEP definition

1 - General Information

ID	Question	Options	Ans-wer	Explana-tion
1,1	The method for ecological potential definition and assessment for lakes/reservoirs which is described in this questionnaire:	is the official method in the country		
		is already developed and being used in 3rd RBMPs		
		is developed but still being tested in pilot cases; method will soon be applied in 3rd RBMPs		
		is in early stages of development and application in test cases not started yet - please explain if method will be applied in 3rd RBMPs		
		other		
1,2	The method for ecological potential definition and assessment for lakes/reservoirs which is described in this questionnaire:	is conceptually the same as applied to rivers but adapted to lakes/reservoirs		
		is conceptually different from the method applied to rivers		
		other		
1,3	Level of application of ecological potential definition method for lakes/reservoirs:	*select one answer from the options on the right*		
1,4	Which approach for ecological potential definition does your method follow? *See instructions document for an overview of the reference approach and mitigation measures ap-proach. For more detailed description, see Chapter 5.3.1 and 5.3.2 of CIS Guidance Document no. 37*	*select one answer from the options on the right*		

	1,5	Key references	Please provide links to the documents that describe your method for HMWB designation and ecological potential definition (also links to English translations if possible)		
	1,6	Does your ecological potential definition method include one or more steps that are equivalent to the different steps described in the CIS Guidance Document no. 37?	Yes – Please fill in next questions for each step separately		
			No, method has no equivalent steps – Please describe your approach in the Section 2 of this questionnaire		
	1,7	Step A. Identification of the closest comparable water category ***Step A. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 5		
			No, our method has no equivalent step – Please explain to the right		
	1,8	Step B1. Identify mitigation measures relevant to each of the hydromorphological alterations and ecologically effective in the physical context of the water body ***Step B1. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 6		
			No, our method has no equivalent step – Please explain to the right		
	1,9	Step B2. Exclude mitigation measures with significant adverse effect on use or wider environment ***Step B2. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 7		
			No, our method has no equivalent step – Please explain to the right		

	1,10	Step B3. Select most ecologically beneficial (combination of) measures taking into account need to ensure best approximation to ecological continuum ***Step B3. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 8		
			No, our method has no equivalent step – Please explain to the right		
	1,11	Step C. Derivation of hydromorphological conditions for MEP ***Step C. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 9		
			No, our method has no equivalent step – Please explain to the right		
	1,12	Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type ***Step D. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 10		
			No, our method has no equivalent step – Please explain to the right		
	1,13	Step E. Derivation of BQE conditions for MEP ***Step E. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 11		
			No, our method has no equivalent step – Please explain to the right		
	1,14	Step F. Derivation of BQE conditions for GEP ***Step F. If this step is not covered by your***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 12		

		method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face			
			No, our method has no equivalent step – Please explain to the right		
	1,15	Step G. Derivation of supporting quality element conditions for GEP ***Step G. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 13		
			No, our method has no equivalent step – Please explain to the right		
	1,16	Step H. Identification of mitigation measures for GEP ***Step H. If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 14		
			No, our method has no equivalent step – Please explain to the right		
	1,17	Monitoring to assess whether GEP is being achieved ***If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 15		
			No, our method has no equivalent step – Please explain to the right		
	1,18	Are there GEP measures that are disproportionally expensive or infeasible? ***If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 16		

	ID	Question	Options	Answer	Explanation
			No, our method has no equivalent step – Please explain to the right		
	1,19	Implement GEP measures and monitor effects on BQEs and supporting quality elements ***If this step is not covered by your method yet, please describe how you plan to approach this WFD issue/principle in your method in the future and any challenges you may face***	Yes, our method has an equivalent step – Please also fill in questionnaire Section 17		
			No, our method has no equivalent step – Please explain to the right		

2 - Description of method in case of no equivalent steps to CIS no. 37

	ID	**Question**	**Options**	**Ans-wer**	**Explana-tion**
	2,1	Description of method	Please describe your method for ecological potential definition and assessment, in case your method has no step equivalent to CIS Guidance no. 37		

3 - Description of HMWB selected for this questionnaire

3 - Description of HMWB selected for this questionnaire

ID	Question	Options	Answer	Explanation
3,1	Simple sketch of the selected HMWB example and its neighbouring water bodies.	Provide simple sketch with short description in words in separate file (Word, PPT or pdf) Indicate and number the distinct water bodies relevant for the decision-making on ecological potential definition ("WB 1, WB 2, WB 3 ...")		
3,2	Size (area and depth class) of water bodies in example/case study (refer to sketch)	Please refer to sketch		
3,3	Name of RBD	Provide name of RBD		
3,4	Which water body/bodies has/have been designated as HMWB in this case study?	Clearly indicate water body/bodies Example: e.g. water bodies 1-4 designated as HMWB; water bodies 5-7 as natural water bodies		
3,5	What is the current ecological potential or ecological status of the water bodies identified in this example/case study?	Example: e.g. water bodies 1 and 2 good potential, water bodies 3 and 4 moderate potential, water bodies 5-7 good status		
3,6	If the case study includes more than one HMWB, which HMWB has been selected as an example to describe ecological potential definition in this questionnaire?	Indicate selected HMWB		
3,7	Original (pre-modification) category of the selected HMWB	*select one answer from the options on the right*		
3,8	Please describe the selected HMWB according to WFD Typology Descriptors:	Ecoregion - *See Ecoregions shown on map A in WFD Annex XI*		
3,9		Altitude / altitude class		
3,10		Geology		
3,11		Catchment area / catchment area class		
3,12		Mean depth class		
3,13		Size (surface area) class		
3,14		Lake(s)/reservoir residence time		
3,15	Has typology system B been used for the characterization of the selected HMWB *If yes, please respond to the next question*	*select one answer from the options on the right*		

	3,16	If system B has been used, describe your lake type. In case the original (pre-modification) category was "river", describe your original river type	Example: e.g. Small and medium-size stratified (dimictic) semi-mountain reservoirs as lake type		
	3,17	Has a hydromorphological lake type been defined? *If yes, please respond to the next question*	*select one answer from the options on the right*		
	3,18	If a hydromorphological lake type has been defined, please describe it	Example: e.g. Deep mountain lake with long residence time		
	3,19	Is the selected HMWB and neighbouring water bodies within natural fish zone or outside natural fish zone?	Example: e.g. WB 1, 2 - outside natural fish zone, WB 3,4,6, within natural fish zone		
	3,20	Biocoenotic region of tributaries and outflow (cf Rhithron-Potamon concept)	Epirhithral		
			metarhithral		
			hyporhithral		
			epipotamal		
			metapotamal		
			hypopotamal		
	3,21	Are migratory fish species (diadromous or potamodromous species) relevant in the selected HMWB and in neighbouring water bodies? If yes, which species? * ***It should be noted that continuity measures are relevant for all fish species (not just medium/long distant migrators) and also for other biota (e.g. benthic invertebrates)***	Example: e.g. WB 3-5: white fish spawning in tributaries		
	3,22	Are any protected habitats or species present? Is selected HMWB and neighbouring water bodies in WFD protected areas (Annex IV) e.g. Natura 2000?	Example: e.g. WB 3-6 in Natura 2000 area		
	3,23	What other key pressures (except hydromorphological ones) affect the selected HMWB?	Briefly name other key pressures		
	3,24	Other relevant information on the area surrounding the selected HMWB (e.g. type of land use at lake shore and catchment area)	Example: e.g. forest or roads and railways		

Questionnaire Block: Steps for the definition of ecological potential

4 - Pre-step. Designation of HMWB & information from earlier planning cycles

4 - Pre-step. Designation of HMWB & information from earlier planning cycles

ID	Question	Options	Answer	Explanation
4,1	Have the principles and steps of the CIS Guidance Document No.4 been used for the designation of the HMWB?	*select one answer from the options on the right*		
4,2	Has the designation of the HMWB been reviewed for the new (3rd) planning cycle? *(For more information, see check-list of issues for such a review in section 4.2 of CIS Guidance Document no. 37)*	*select one answer from the options on the right*		
4,3	How has it been assessed whether the water body is substantially changed in character (WFD Article 2(9)) (change in character must be extensive/widespread and profound)?	Use of specific thresholds and criteria (e.g. percentage of water body surface area irreversibly affected)		
		Use of specific hydromorphological assessment methods		
		Presence of structures without quantified criteria (e.g. significant lowering of the water level)		
		Use of expert judgement on case-by-case basis without criteria		
		Other – please explain		
4,4	Have any mitigation measures been in place prior to designation of the water body as HMWB?	*select one answer from the options on the right*		
4,5	Is the selected HMWB a transboundary water body? *If yes, please respond to the next question*	*select one answer from the options on the right*		
4,6	If selected HMWB is transboundary, has any action been taken to coordinate HMWB designation and definition of MEP/GEP with the neighbouring country(s)?	*select one answer from the options on the right*		
Physical modifications and their effects				

	4,7	What is (are) the main physical modification(s) that led to the designation of the selected HMWB? Please choose from the “most common” physical modifications for lakes/reservoirs. If the main physical modifications of your selected HMWB are not covered by the most common, please choose from “others”.	***Most common physical modifications:***		
			Reservoir operation - hydropower with hydropeaking		
			Reservoir operation - others		
			Shore fixation or modification (erosion control e.g. revetment, rip-rap, foreshore armouring, sheet piling)		
			Abstractions		
			Dam/embankments with raised lake water level		
			Changed residence time (e.g. through modification of a lake outlet)		
			Weir, barrage, lock or other structure with lake water level regulation		
			Other physical modifications:		
			Reservoir operation - pumped storage (e.g. return of water from water body downstream)		
			Maintenance (e.g sediment removal/dredging, physical disturbance through dredging, weed cutting, removal of woody debris)		
			Water discharge, intra- or inter-catchment transfers		
			Deepening of lake by excavation / changed depth conditions		
			Port, harbour or marina infrastructure (quaylines, berths, pontoons, moorings)		
	4,8	Which hydromorphological supporting elements have been directly or indirectly changed (adversely affected) as a result of the main physical modification(s)? Estimate the level of the effect of the main physical modification(s) for the different elements listed and	Hydrology: quantity and dynamics of flow		

		provide a qualitative description of the main hydro-morphological alterations.			
			Hydrology: residence time		
			Hydrology: connection to groundwaters		
			Hydrology: permanent alteration of mean water level		
			Hydrology: water level fluctuations		
			Continuity to tributaries or outflow		
			Morphology: lake depth variation		
			Morphology: lake bottom structure		
			Morphology: structure of lake shore		
			Please provide a qualitative description of the main hydromorphological alterations to the right *Example: e.g. Water abstraction leading to strong seasonal water level variation; short-term water level fluctuation for hydro-electric power generation; lowering of water level by 15-20 m in the 1950-80s and alteration of lake shore Altered substrate conditions (increased fine sediment input)*		
	4,9	What physico-chemical supporting elements have been adversely affected directly by the main physical modification(s), or indirectly as a result of changes to the hydromorphological character of the water body? Estimate the level of the effect of the main physical modification(s) for the different elements listed and provide a qualitative description of the main physico-chemical alterations.	Transparency		
			Thermal conditions		
			Oxygenation		
			Salinity		
			Acidifcation		
			Nutrient conditions		
			Specific pollutants		
			Please provide a qualitative description of the main physico-chemical alterations to the right		

			Example: e.g. Increased water temperature, reduced oxygen concentration, increased salinity in the hypolimnion, enhanced pH values in the epilimnion due to algal blooms		
	4,10	Which biological quality elements have been adversely affected and how? (i.e. impacts on original ecology prior to any mitigation) Estimate the level of the effect of the main physical modification(s) for the different elements listed and provide a qualitative description of the main ecological impacts.	Phytoplankton		
			Macrophytes		
			Phytobenthos		
			Benthic Invertebrate fauna		
			Fish fauna		
			Several/all BQE very likely affected, by expert judgement		
			Please provide a qualitative description of the main ecological impacts to the right *Example: e.g. Increase of eutraphent phytoplankton species; Reduced abundance / loss of sensitive fish species with spawning sites in littoral reed stands or in tributaries; Increased abundance of tolerant species (e.g. benthic invertebrates); Reduced abundance / loss of helophytes*		
	4,11	What would the overall ecological status (class) of the HMWB be when assessed using methods for natural water bodies of the same type?	select one answer from the options on the right Please also explain - e.g. the overall ecological status was “bad” based on benthic invertebrates (bad status), fish (poor status)		
	4,12	Is detailed monitoring data available on hydromorphological conditions and has overall hydromorphological status been assessed?	select one answer from the options on the right Please also explain - e.g. There are detailed monitoring data available on in-/outflow and water level fluctuations but much less on shore modifications and overall hydromorphological status has been assessed as bad.		
	4,13	Is detailed monitoring data available on BQEs?	select one answer from the options on the right		

		Please also explain - e.g. There are detailed monitoring data available on biological quality elements, providing detailed knowledge of the biological impacts especially on benthic invertebrates and fish.		
4,14	Have biological assessment methods been used which are sensitive to hydromorphological alterations in lakes/reservoirs?	*select one answer from the options on the right* Please also explain - e.g. Biological assessment methods are used for fish and benthic invertebrates which are sensitive to hymo alterations in lakes/reservoirs.		
Water uses				
4,15	Which water use(s) was the selected HMWB mainly designated for?	Navigation; ports		
		Flood protection		
		Hydropower		
		Irrigation		
		Water supply		
		Recreation		
		Drainage		
		Urbanisation		
		Other		
4,16	Which other water uses are present in the selected HMWB?	Navigation; ports		
		Flood protection		
		Hydropower		
		Irrigation		
		Water supply		
		Recreation		
		Drainage		
		Urbanisation		
		Other		
Navigation - If selected HMWB is used for navigation, please provide information on the following:				
4,17	Purpose of navigation	Commercial		
		Recreational		
		Military		
		Other		

	4,18	Intensity of navigation	Example: e.g. average number of ships, tonnage per day, number of passengers per day		
	4,19	Other relevant information	Please enter your text response on the right		
	Flood protection - If selected HMWB is used for flood protection, please provide information on the following:				
	4,20	Purpose of flood protection	Protection of urban areas		
			Protection of agricultural areas		
			Protection of infrastructure and traffic routes		
			Protection of cultural heritage		
			Other - please explain		
	4,21	Level of flood protection provided	Example: e.g. protection against a 50-year or 100-year flood		
	4,22	Other relevant information	Please enter your text response on the right		
	Storage for hydropower - If selected HMWB is used for hydropower, please provide information on the following:				
	4,23	Type of plant	*select one answer from the options on the right*		
	4,24	Head (m)	Please enter your text response on the right		
	4,25	Installed capacity (MW) (indicate range / choose from the categories provided)	*select one answer from the options on the right*		
	4,26	Other uses benefiting from storage scheme (e.g. irrigation, recreation)	Please enter your text response on the right		
	4,27	Other relevant information on the HP scheme	Please enter your text response on the right		
	Storage for water supply and/or irrigation scheme - If selected HMWB is used for water supply and/or irrigation scheme, please provide information on the following:				
	4,28	Abstracted volume (annual)	Please differentiate between water supply and irrigation, if necessary Example: e.g. 45 Mm3 per year for domestic water supply 30Mm3; 15Mm3 for irrigation)		
	4,29	Population supplied from storage scheme	Please enter your text response on the right		
	4,30	Agricultural area supplied from storage scheme	Please enter your text response on the right		
	4,31	Other users supplied with water from storage scheme	Please enter your text response on the right		
	4,32	Other relevant information on the water supply scheme	Please enter your text response on the right		
	Recreation - If selected HMWB is used for recreation, please provide information on the following:				
	4,33	Description of recreational use of water with relevance to the physical modifications of the HMWB	Please enter your text response on the right		
	Drainage - If selected HMWB is used for drainage, please provide information on the following:				
	4,34	Purpose of drainage	Land improvement and reclamation for agriculture		

			Land improvement for forestry		
			Land improvement for urban development		
			Protection of infrastructure and traffic routes		
			Other – please explain		
	4,35	Type of drainage infrastructure	Example: e.g. surface drainage, drainage ditch, culverts, subsurface drainage (tile drains, rubble drains or mole drains)		
	4,36	Other relevant information	Please enter your text response on the right		
	Urbanisation - If selected HMWB is used for urbanisation, please provide information on the following:				
	4,37	Description of urbanisation with relevance to the physical modifications of the HMWB	Please enter your text response on the right		

5 - Step A. Identification of closest comparable water category

	ID	Question	Options	Answer	Explanation
	5,1	Briefly explain your general method / approach to define what the closest comparable water category is.	Please enter your text response on the right		
	5,2	What is the closest comparable water category for the selected HMWB in your case study?* ***ATTENTION:** If the selected HMWB is a reservoir, i.e. was a river which now resembles a lake water category, responses should be provided in this Lakes/Reservoirs questionnaire (see instructions to questionnaire)*	*select one answer from the options on the right*		
			Only if conditions between river and lake are relevant for the selected HMWB, please select also the option to the right		

6 - Step B1. Identify mitigation measures relevant to each of the hydro-morphological alterations and ecologically effective in the physical context of the water body

6 - Step B1. Identify mitigation measures relevant to each of the hydromorphological alterations and ecologically effective in the physical context of the water body

ID	Question	Options	Answer	Explanation
6,1	Briefly explain your general method / approach to define what the closest comparable water category is.	Please enter your text response on the right		
6,2	Which potential groups of mitigation measures were identified as appropriate for improving the conditions of the selected HMWB?	Enhancement of shore/shallow habitats (especially in the littoral zone)		
		Creation of secondary habitats		
		Removal/replacement of shore fixation		
		Management of reservoir/lake level		
		Management of sediments		
		Management of lake use / designation of protected areas		
		Ecologically optimised fisheries management		
		Fish migration aids /Improvement of connectivity to riverine habitats/tributaries/other lakes		
		Mitigation of effects on physico-chemical parameters in lake		
		Other – ***to be defined in explanation***		
6,3	Were any of the potential groups of measures (see previous question) not expected to be relevant and ecologically effective in addressing the key ecological impacts in this water body?	Example: e.g. Group 8 Fish migration aids were not expected to deliver any significant ecological benefit due to a very short reaches of tributaries. Therefore they were left out from the selection of potential mitigation measures for MEP.		
6,4	For each group of potential mitigation measures for MEP: What concrete practical measures did you consider for the MEP of the selected HMWB? How were these practical measures expected to contribute to improving hydromorphological conditions and conditions for BQEs?	Enhancement of shore/shallow habitats (especially in the littoral zone)		

			Creation of secondary habitats		
			Removal/replacement of shore fixation		
			Management of reservoir/lake level		
			Management of sediments		
			Management of lake use / designation of protected areas		
			Ecologically optimised fisheries management		
			Fish migration aids /Improvement of connectivity to riverine habitats/tributaries/other lakes		
			Mitigation of effects on physico-chemical parameters in lake		
			Other		
	6,5	Has the achievement of objectives in water bodies downstream and upstream of the selected HMWB been considered when identifying relevant mitigation measures for MEP (according to WFD Art. 4(8))? *Explain how.*	*select one answer from the options on the right*		
	6,6	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

7 - Step B2. Exclude mitigation measures with significant adverse effect on use or wider environment

7 - Step B2. Exclude mitigation measures with significant adverse effect on use or wider environment

ID	Question	Options	Answer	Explanation
7,1	Do you have a general or national method in place to assess adverse effects of mitigation measures on use or wider environment in your country?	*select one answer from the options on the right*		
7,2	Does your method define the benefits of different water use(s) and the wider environment?	*select one answer from the options on the right*		
7,3	Does your method define and quantify different types of adverse effects of mitigation measures on different water uses and wider environment?	*select one answer from the options on the right*		
7,4	Does your method include specific criteria to define what is significant and what is not significant for each type of adverse effect?	*select one answer from the options on the right*		
7,5	If your method does not include any specific criteria, how do you decide which adverse effects are significant and which are not significant? What is taken into account?	Please enter your text response on the right		
7,6	For the selected HMWB: Were any of the mitigation measures identified in Step B1 excluded from MEP, because they have significant adverse effect on use (i.e. the uses for which the water body is designated and any other relevant uses) or wider environment?	*select one answer from the options on the right*		
7,7	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

8 - Step B3. Select most ecologically beneficial (combination of) measures taking into account need to ensure best approximation to ecological continuum

8 - Step B3. Select most ecologically beneficial (combination of) measures taking into account need to ensure best approximation to ecological continuum

ID	Question	Options	Answer	Explanation
8,1	Briefly explain your general method / approach for selecting the most ecologically beneficial measures and taking into account the need to ensure best approximation to ecological continuum	Please enter your text response on the right		
8,2	Which of the mitigation measures were finally selected as the most ecologically beneficial (combination of) measures for the MEP of the selected HMWB?	Please enter your text response on the right		
8,3	Did you have enough information and data available to assess whether the measures selected for MEP can deliver sufficient improvements to ecological functioning?	*select one answer from the options on the right*		
8,4	How was the need to ensure best approximation to ecological continuum taken into account for the selection of MEP mitigation measures for this HMWB?	Please enter your text response on the right		
8,5	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

9 - Step C. Derivation of hydromorphological conditions for MEP

9 - Step C. Derivation of hydromorpho-logical conditions for MEP

ID	Question	Options	Ans-wer	Explana-tion
9,1	Briefly explain your general method / approach to derive hydromorphological conditions for MEP	Please enter your text response on the right		
9,2	Was it possible to derive the hydromorphological conditions for MEP for the selected HMWB?	*select one answer from the options on the right*		
9,3	Have the following aspects been considered for deriving hydromorphological conditions for MEP for the selected HMWB?	Current hymo conditions altered by physical modifications		
		Prediction of the expected effects of mitigation measures defined for MEP		
		Reference conditions of the original water body type		
		Other aspects - Please explain		
9,4	Have the derived hydromorphological conditions for MEP been used to identify or derive the closest comparable water body type for the selected HMWB? Please explain how	Yes – Please explain		
		No, other aspects were used to identify or derive the closest comparable water body type		
		No, no closest comparable water body type could be derived		
9,5	The closest comparable water body type for the selected HMWB has been derived from the following:	Original natural water body type (prior to the physical modification)		
		Different water body type, after adopting the changed hymo conditions due to the HMWB modifications		
9,6	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

10 - Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type

10 - Step D. Derivation of physico-chemical conditions for MEP, taking into account the closest comparable water body type

ID	Question	Options	Ans-wer	Explana-tion
10,1	Briefly explain your general method / approach to define physico-chemical conditions for MEP	Please enter your text response on the right		
10,2	Was it possible to derive the physico-chemical conditions for MEP for the selected HMWB?	*select one answer from the options on the right*		
10,3	Have the following aspects been considered for deriving physico-chemical conditions for MEP for the selected HMWB?	Closest comparable water body type		
		Effects of the modification(s) on physico-chemical elements		
		Effects of the mitigation measures for MEP on physico-chemical elements		
		Other aspects - Please explain		
10,4	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

11 - Step E. Derivation of BQE conditions for MEP

11 - Step E. Derivation of BQE conditions for MEP

ID	Question	Options	Answer	Explanation
11,1	Briefly explain your general method / approach to derive BQE conditions for MEP	Please enter your text response on the right		
11,2	Was it possible to derive BQE conditions for MEP for the selected HMWB? If not, please explain why.	*select one answer from the options on the right*		
11,3	For which BQE, have conditions for MEP been derived?	Benthic invertebrates		
		Fish fauna		
		Macrophytes		
		Phytobenthos		
		Phytoplankton		
		None		
11,4	Are all BQE covered which are relevant for the water category of the selected HMWB? If not, please explain why.	*select one answer from the options on the right*		
11,5	Have the following aspects been considered for deriving BQE conditions for MEP for the selected HMWB?	Closest comparable water body type		
		Effects of the hydromorphological modifications on BQE		
		Effects of the mitigation measures for MEP on BQE		
		Other aspects - Please explain		
11,6	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

12 - Step F. Derivation of BQE conditions for GEP

12 - Step F. Derivation of BQE conditions for GEP

ID	Question	Options	Answer	Explanation
12,1	Briefly explain your general method / approach to derive BQE conditions for GEP.	Please enter your text response on the right		
12,2	Which classes of ecological potential do you assess?	Maximum		
		Good		
		Moderate		
		Poor		
		Bad		
12,3	How did you derive/define the classes of ecological potential (maximum, good, moderate, poor, bad)?	Assessment method of natural water bodies with adapted classes (e.g. good potential instead of moderate status)		
		Assessment method of natural water bodies with adapted metric values and/or class boundaries		
		New assessment method for heavily modified water bodies		
		Expert judgement		
		Other (please explain)		
12,4	Was it possible to derive BQE conditions for GEP for the selected HMWB?	*select one answer from the options on the right*		
12,5	For which BQE, have BQE conditions for GEP been derived for the selected HMWB?	Benthic invertebrates		
		Fish fauna		
		Macrophytes		
		Phytobenthos		
		Phytoplankton		
		None		
12,6	Are all BQE covered which are relevant for the water category of the selected HMWB? If not, please explain why.	*select one answer from the options on the right*		
12,7	How have “slight changes” in the values of BQEs been interpreted and applied as compared to the values found at MEP?	Please enter your text response on the right		
12,8	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

13 - Step G. Derivation of supporting quality element conditions for GEP

13 - Step G. Derivation of supporting quality element conditions for GEP

ID	Question	Options	Answer	Explanation
13,1	Briefly explain your general method / approach to derive supporting quality element conditions for GEP	Please enter your text response on the right		
13,2	Hydromorphological quality element conditions for the GEP of the selected HMWB have been derived based on the following:	The BQE conditions for GEP (step F of reference approach route)		
		The effects from the assumed implementation of the mitigation measures for GEP on hymo quality elements, excluding those delivering only “slight changes” to biological conditions (step H of mitigation measures approach route)		
		Other – please explain		
13,3	Have the following aspects been considered for deriving hydromorphological conditions for GEP of the selected HMWB?	Difference between BQE conditions of MEP (step E) and GEP (Step F)		
		Consideration of hydromorphological conditions for MEP (step C)		
		Consideration of ecological functioning, taking into account the need to ensure close to best approximation of ecological continuum		
		Other aspects		
13,4	Do physicochemical quality element conditions for GEP of the selected HMWB correspond to the values for good ecological status of the original natural river type?	Yes, they correspond for all parameters		
		No, they do not correspond for one or more parameters which are impacted by the hydromorphological alteration leading to HMWB designation		
		Other, explain		
13,5	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

14 - Step H. Identification of mitigation measures for GEP

14 - Step H. Identification of mitigation measures for GEP

ID	Question	Options	Answer	Explanation
14,1	Briefly explain your general method / approach to identify mitigation measures for GEP	Please enter your text response on the right		
14,2	Mitigation measures for GEP for the selected HMWB have been identified based on the following:	the derived biological conditions and conditions for supporting quality elements for GEP (step F and G of reference approach route)		
		the set of mitigation measures identified for MEP (step B of mitigation measures approach route)		
		Other – please explain		
14,3	Which are the specific practical mitigation measures selected for GEP of the selected HMWB?	Enhancement of shore/shallow habitats (especially in the littoral zone)		
		Creation of secondary habitats		
		Removal/replacement of shore fixation		
		Management of reservoir/lake level		
		Management of sediments		
		Management of lake use / designation of protected areas		
		Ecologically optimised fisheries management		
		Fish migration aids /Improvement of connectivity to riverine habitats/tributaries/other lakes		
		Mitigation of effects on physico-chemical parameters in lake		
		Other		
14,4	To what extent is the list of GEP mitigation measures for the selected HMWB similar to the list of MEP mitigation measures?	The list of GEP measures is the same as for MEP but the GEP measures significantly differ from the MEP measures in intensity (extent)		
		The list of GEP measures is different than the list of measures for MEP, because certain MEP measures are not needed for GEP		
		Other, explain		
14,5	If the list of GEP measures for the selected HMWB differs from the list of MEP measures (under step B), this is the case because:	Not all MEP measures are likely to be necessary to achieve BQE values for GEP		
		Certain MEP measures are assumed to deliver only slight improvements to ecology		

			Other reason – please explain		
	14,6	What is the spatial extent of the selected GEP mitigation measures for defining GEP of the selected HMWB?	Whole water body, 100% of area (lakes/reservoirs)		
			Proportion of water body area or shore length – Please explain and indicate value e.g. 50 %		
			All potentially suitable locations for habitat enhancement		
			Proportion of potentially suitable locations for habitat enhancement – Please explain and indicate value e.g. 50 %		
			Others		
	14,7	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

Questionnaire Block: Implementation of measures to achieve GEP

15 - Monitoring to assess whether GEP is being achieved

15 - Monitoring to assess whether GEP is being achieved

ID	Question	Options	Answer	Explanation
15,1	Has the ecological condition of the selected HMWB already been monitored to assess whether the expected mitigation from existing measures has been delivered and whether GEP is being achieved?	*select one answer from the options on the right*		
15,2	What kind of monitoring and assessment methods were used to classify the current ecological potential?	Monitoring and assessment of BQEs with hydromorphology-sensitive methods		
		Monitoring and assessment of BQEs without hydromorphology-sensitive methods		
		Monitoring and assessment of hydromorphological (and physico-chemical) quality elements		
15,3	How has the ecological potential of the selected HMWB been classified?	Selected HMWB is currently at GEP, therefore no further mitigation measures are implemented		
		Selected HMWB is at less than GEP, and GEP mitigation measures need to be implemented		
		Not possible to classify – please explain		
15,4	Were there questions you could not answer in relation to this step? If so, please explain.	Please enter your text response on the right		

16 - Are there GEP measures that are disproportionally expensive or in-feasible?

16 - Are there GEP measures that are dispropor-tionally expensive or infeasible?

ID	Question	Options	Ans-wer	Explana-tion
16,1	Were there GEP measures for the selected HMWB that were demonstrated to be disproportionally expensive?	Yes - please explain which measures from the GEP list were disproportionally expensive		
		No, none		
		Unclear – please explain		
16,2	Were there GEP measures that were demonstrated to be infeasible?	Yes - please explain which measures from the GEP list were in-feasible and give reasons of the infeasibility		
		No, none		
		Unclear – please explain		
16,3	Do you assess whether measures are disproportion-ately expensive or infeasible at this stage in the process, i.e. when mitigation measures are to be implemented within the programme of measures to achieve GEP?	*select one answer from the options on the right*		
16,4	If you do not assess whether measures are dispro-portionately expensive or infeasible at this stage in the process, please indicate when this assessment takes place	At an earlier stage in the process of defining and assessing eco-logical potential – Please explain		
		At a later stage in the process of defining and assessing ecologi-cal potential – Please explain		
		Other – Please explain		
16,5	In case one or more GEP measures were ruled out because they are disproportionally expensive or in-feasible, were the remaining measures still sufficient to achieve GEP?	Yes, remaining measures were sufficient to achieve GEP		
		No, remaining measures were not sufficient to achieve GEP but measures have been reviewed and re-designed to deliver GEP		
		No, remaining measures were not sufficient to achieve GEP and HMWB was classified as less than GEP (application of Art. 4.5 exemption)		
		Unclear – please explain		
16,6	Were there questions you could not answer in rela-tion to this step? If so, please explain.	Please enter your text response on the right		

17 - Implement GEP measures and monitor effects on BQEs and supporting quality elements

17 - Implement GEP measures and monitor effects on BQEs and supporting quality elements	ID	Question	Options	Answer	Explanation
	17,1	Which GEP measures for the selected HMWB have been or are being implemented as part of the RBMP programmes of measures?	Please enter your text response on the right		
	17,2	Has any evidence from monitoring been collected already on their success?	Please enter your text response on the right		
	17,3	Have any changes been made to the mitigation measures on the basis of evidence from monitoring?	Please enter your text response on the right		
	17,4	Have other lessons been learned from monitoring?	Please enter your text response on the right		

18 - Lessons learned & further developments

18 - Lessons learned & further developments	ID	Question	Options	Ans-wer	Explana-tion
	18,1	What are your key lessons learned from applying your method on ecological potential definition on HMWB in your country?	Please enter your text response on the right		
	18,2	Strengths of your method for ecological potential definition	Please enter your text response on the right		
	18,3	Weaknesses of your method for ecological potential definition	Please enter your text response on the right		
	18,4	Which steps of the approach on ecological potential definition, that is proposed in CIS Guidance no. 37, would you like to have more practical guidance and examples on?	Please enter your text response on the right		
	18,5	If you have started developing a new method to be applied in the future (after the 3rd RBMPs), please explain whether you intend to use CIS Guidance no. 37 in your new method or any alternative approach you are proposing.	Please enter your text response on the right		