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Videoconference, 26-28 April 2021

**Agenda item 4: Monitoring Guidelines/Protocols for Analytical Quality Assurance and Reporting of Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20**

**Monitoring Guideline for Reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20**

# Note by the Secretariat

In line with the Programme of Work 2020-2021 adopted by COP 21, UNEP/MAP-MED POL Programme has prepared the Monitoring Guidelines /Protocols for: i) Reporting Monitoring Data; ii) Analytical Quality Assurance for IMAP Common Indicators 13, 14, 17, 18 and 20; and iii) IMAP Common Indicator 18 for consideration of the Meeting on CorMon on Pollution Monitoring planned (26-28 April 2021). Along with the Monitoring Guidelines related to IMAP Common Indicators 13, 14, 17 and 20 that have been agreed by the Integrated Meetings of the Ecosystem Approach Correspondence Groups on Monitoring (1-3 December 2020), these monitoring guidelines form a coherent manual to guide technical personnel of IMAP competent laboratories of the Contracting Parties for the implementation of standardized and harmonized monitoring practices related to a specific IMAP Common Indicator (i.e. sampling method, sample preservation and transportation, sample preparation and analysis, along with quality assurance and reporting of monitoring data).

The Monitoring Guideline on Reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20 elaborates the protocols for data reporting to IMAP (Pilot) Info System INFO/RAC database by building upon IMAP Guidance Fact Sheets for IMAP Common Indicators 13, 14, 17, 18 and 20 (UNEP/MAP, 2019); standardized protocols (UNEP/MAP, 2019a); Data Quality Assurance Schemes (UNEP/MED WG.492/Inf.14); Data Standards (DSs) and Data Dictionaries (DDs) for IMAP Common Indicators 13, 14 and 17 20 (Annex I) and IMAP Pilot Info System: Quality Assurance and Quality Controls (UNEP/MAP, 2019d), in order to allow the comparability of the data for reliable assessment of GES.

Hence, this Monitoring Guideline includes four protocols gathered under the Technical Note for Reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20, as follows: i) Protocol for Reporting Monitoring Data for IMAP Common Indicators 13 and 14; ii) Protocol for Reporting Monitoring Data for IMAP Common Indicators 17; iii) Protocol for Reporting Monitoring Data for IMAP Common Indicators 18 and iv) Protocol for Reporting Monitoring Data for IMAP Common Indicators 20. The procedures for reporting of monitoring data are optimally interrelated with the Data Standards (DSs) and Data Dictionaries (DSs) as built into IMAP (Pilot) Info System for IMAP Common Indicators 13, 14 and 17 (Annex I).

This document also defines the elements of Data Standards (DSs) and Data Dictionaries (DSs) for IMAP Common Indicators 18 (Annexe II) and 20 (Annexe III) in order for the Meeting to provide recommendations of relevance for the ongoing work of INFO/RAC and MEDPOL. Furthermore, UNEP/MED WG.492/Inf.14 is provided with the aim of presenting more details for data reporting, as already agreed by the 7th Meeting of the Ecosystem Approach Coordination Group (9 September 2019, Athens, Greece).

The Meeting is expected to discuss this document and endorse its submission for consideration of the Meeting of MEDPOL Focal Points that will be held in May 2021.

## List of Abbreviations / Acronyms

| | |
|---|---|
| **CAS** | CAS Registry Number, is a unique numerical identifier assigned by the Chemical Abstracts Service (CAS) |
| **CI** | Common Indicator |
| **COP** | Conference of the Parties |
| **CORMON** | Correspondence Group on Monitoring |
| **CP** | Contracting Parties |
| **DDs** | Data Dictionaries |
| **DSs** | Data Standards |
| **EcAp** | Ecosystem Approach |
| **EO** | Ecological Objective |
| **EU** | European Union |
| **GES** | Good Environmental Status |
| **IMAP** | Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria |
| **LOD** | Limit of Detection |
| **LOQ** | Limit of Quantification |
| **MAP** | Mediterranean Action Plan |
| **MEDPOL** | Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea |
| **MSFD** | Marine Strategy Framework Directive |
| **RDBMS** | Relational Data Base Management System |
| **SI** | International System of Units (SI, abbreviated from the French Système international (d'unités)) |

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## 1.    Introduction

1.    Reporting is an important step within the monitoring process of the marine environment. Through proper reporting assessment of GES regarding Ecological Objectives 5 and 9, as presented in details in the IMAP Guidance Factsheets (UNEP/MAP, 2019) [1] will be allowed and maintained.

2.    Hence this Guideline on Reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20, elaborates the protocols for data reporting to the INFO/RAC database, along with detail guidance on applying necessary procedures, addressing weak points and resolving the problems.

3.    This Guideline builds upon the UNEP/MAP Integrated Monitoring and Assessment Programme (IMAP) respectively IMAP Guidance Fact Sheets for IMAP Common Indicators 13, 14, 17, 18 and 20 (UNEP/MAP, 2019); standardized protocols (UNEP/MAP, 2019a)[2]; Data Quality Assurance schemes (UNEP/MAP, 2019b)[3]; Data Standards (DSs) and Data Dictionaries (DDs) for Common Indicators related to Pollution and Marine Litter (UNEP/MAP, 2019c)[4] and IMAP Pilot Info System: Quality Assurance and Quality Controls (UNEP/MAP, 2019d)[5] in order to allow the comparability of the data for reliable assessment of GES.

4.    The below flow diagram informs on the category of this Monitoring Guidelines related to reporting of monitoring data within the structure of all Monitoring guidelines prepared for IMAP Common Indicators 13, 14, 17, 18 and 20.
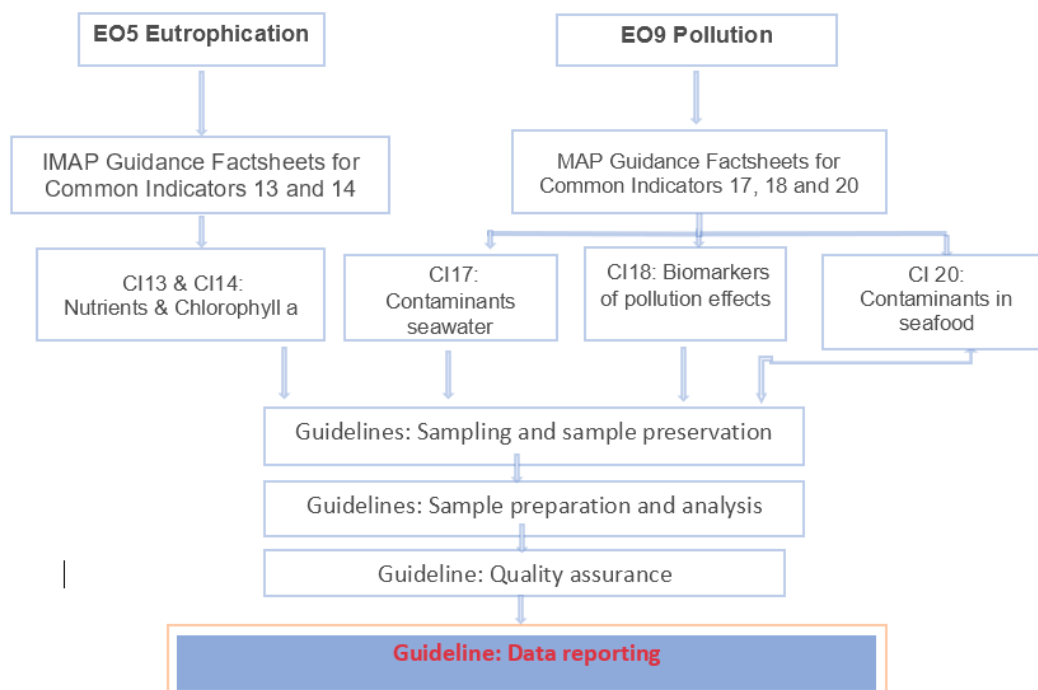


**Flow Diagram:** Monitoring Guidelines for IMAP Ecological Objectives 5 and 9.

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[1] (UNEP/MAP, 2019), UNEP/MED WG.467/5. IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21: New proposal for candidate indicators 26 and 27.
[2] (UNEP/MAP, 2019a), UNEP/MED WG.463/6. Monitoring Protocols for IMAP Common Indicators related to pollution.
[3] (UNEP/MAP, 2019b), UNEP/MED WG.467/13. Schemes for Quality Assurance and Control of Data related to Pollution
[4] UNEP/MAP, 2019c. UNEP/MED WG.467/8. Data Standards and Data Dictionaries for Common Indicators related to Pollution and Marine Litter
[5] (UNEP/MAP, 2019d). UNEP/MAP WG. 467/12. MAP Pilot Info System: Quality Assurance and Quality Controls

Data quality

5.      The 'data quality' management process is without a doubt the most important component of the overall data management system structure to ensure 'quality data'. The data management involves data policy, data warehousing, and data security components, only to mention a few. However, 'quality data' should guide and support any data-related endeavour, such as the gathering of environmental information through scientific-based monitoring strategies to assess the status of the marine environment (e.g. IMAP of UNEP /MAP).

6.      The 'data quality' approach is a common approach to ensure, control and optimize the value of data from observations in all fields, including science, medicine, business, and politics. However, the 'data quality' concept has many functional attributes.

7.      The building of databases for the collection and use of the monitoring data and pollution load data was seen as a necessity very early within the MED POL Programme. The Monitoring MED POL Database (ca. Microsoft Access SQL database software) was created and included some components and modules, such as plotting and mapping, trend analysis, a remote access module, etc., in an all-in-one approach.

8.      At that time, the overall 'data quality' protocol was based on the internal procedures in place. Briefly, once the dataset files were received from the Contracting Parties, the officer in charge sent the files to the database managers to perform the automatic upload of the data into the database. If problems were encountered during the uploading of the data, a report was produced and sent back to the Contracting Parties for review, correct and officially resubmit the data.

9.      Although this was the most logical procedure, it faced several technical difficulties such as i) the data sent back to the Contracting Parties could be delayed or new problems were found after resubmission; ii) the flagging function from the database could be used only by experts; iii) the errors detected cannot be sorted out easily (e.g. sometimes a digit or a different 'parameter name' invalidates the automatic loading); iv) the submission of 'out of range' values, which were the main causes of the limited direct database applicability for the regional marine assessments. To this aim, it has been decided to shift to an on-line system since 2007-2008.

10.      The adoption of the Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria (Decision IG. 22/7, COP 19, February 2016) furthemore increased the need for even more and larger datasets. For this reason, and due to the fast developments in information systems and technologies, the Secretariat commissioned the development of a new database to the INFO/RAC.

11.      IMAP (Pilot) Info System has been built to strengthen the capacities for data management, along with data reporting, quality assurance and quality controls (UNEP/MAP, 2019d, UNEP/MAP WG. 467/12). The new data management structure allows for an improved data management that is fit-for-purpose for the requirements of the IMAP (i.e. the Barcelona Convention marine monitoring system).

12.      The schemes for Quality Assurance and Control of Data for IMAP (Pilot) Info System have been defined on two levels, as elaborated in UNEP/MAP, 2019b, UNEP/MED WG.467/13 (UNEP/MED WG. 492/Inf.14 ). On the first level, there is a monitoring data Quality Assurance and Quality Control (QA/QC) for each IMAP Common Indicator; on the second level, there is a full Database Quality Management and Reporting Schemes considering present functional modules (i.e. MEDPOL Database approach), both for data technical validation and data flagging.

13.      Generic QA schemes are defined for IMAP Pollution Cluster Common Indicator to be measured and reported at the primary level (Table 2 of UNEP/MAP, 2019b). It further describes both the QA Schemes and QA Categories for each Common Indicator according to its specificities and overall 'data quality' needs to be reported by the Contracting Parties to IMAP (Pilot) Info System (Tables 4a and 4b, of UNEP/MAP, 2019b). Level 1 of QA/QC provides the scheme for data quality assurance, whilst Level 2 provides the scheme for quality assurance of data assessment.

14.     There are basic attributes (i.e. specific requirements of the 'data' within the overall quality framework) to be fulfilled to guarantee both the 'data quality' from an objective point of view and their fit-for-purpose, under the overall Database Quality Management, including the Reporting Schemes. The completeness, accuracy, consistency, timeliness, accessibility and validity are the main attributes to be fulfilled to obtain 'quality data' reported to the IMAP Info System. This is elaborated in UNEP/MED WG.492/7, providing the Monitoring Guidelines/Protocols for Analytical Quality Assurance for IMAP Common Indicators 13, 14, 17, 18 and 20, as well as in UNEP/MED WG.467/13 (UNEP/MED WG. 492/Inf.14 ).

15.     The achievement of these basic attributes guarantees the 'data quality' and should be considered during all the planning process of the data generation, from data collection and reporting, through data storage, up to the data usage by interested parties. The new IMAP (Pilot) Info System platform is designed to facilitate these procedures through data quality algorithms built to support data loading by the Contracting Parties.

16.     The first step of the QA process of IMAP (Pilot) Info System (UNEP/MAP, 2019d) has been the definition of Data Standards (DSs) and Data Dictionary (DDs) and associated formal Quality Controls for the monitoring modules associated to the selected 11 IMAP Common Indicators. They aggregate information in different tables (represented by excel spreadsheets) and, for each table, several fields with different formats are defined. When a field has to be filled by selecting a value included in a predefined list of admissible values, such lists constitute the DD associated to DS. Data are compliant to DSs and DDs if all of the following formal quality controls are satisfied: format; unique coding; coherent linking; regular expression and admissible values.

17.     The second step of QA process of IMAP (Pilot) Info System (UNEP/MAP, 2019d) requires implementation of formal Quality Controls associated to each DSs and DDs in order to verify compliance of  data. In particular, for each DS that corresponds to a monitoring module, the above list of formal quality controls has been defined and implemented in the IMAP (Pilot) Info System. Each row in the list is represented by QC_Code; IMAP Ecological Objective; Common Indicator; DS/module; spreadsheet; field and description.

18.     The process for the collection and quality control of data sets reported into IMAP (Pilot) Info System is implemented for each data standard by the three-way handshaking communication (UNEP/MAP, 2019d):

    –   Step 1: the user, respectively a Contracting Party, downloads the Data Standard corresponding to the monitoring module for which there is a need to transfer monitoring data;
    –   Step 2: after filling the Data Standard with monitoring data, the user uploads the file into the system for the data flow which corresponds to the Data Standard used;
    –   Step 3: The system produces a report of QC formal check validation, with the results of formal quality control applied to the file uploaded and if every quality control is passed, the file is considered as 'formally compliant' (OK!); otherwise as 'formally non - compliant' (Not OK) and the user has to correct the file and upload it again into the system in order pass all the formal quality controls.

19.     The report of QC formal check validation is produced as an excel file containing the information for each row that does not pass the quality control check. Formally compliant data sets, i.e. data that pass above presented the formal Quality Controls, are stored in the Relational Data Base Management System (RDBMS) of the IMAP (Pilot) InfoSystem.

20.     Further application of higher level Database Quality Controls considers (UNEP/MAP, 2019d), for example, the following issues:

    –   Check of admissible ranges or maximum or minimum values for parameters based on statistical analysis of monitoring data; scientific literature reviews and/or fixed constraints due to physical or chemical characteristics, as for example, the range 0-14 of pH;
    –   Geographical location of monitoring stations.

21.     Quality Assurance process for data quality also includes application of additional higher level Quality Controls that needs to be applied for the implementation of the standardized and harmonized

monitoring practices related to a specific IMAP Common Indicator (i.e. sampling, sample preservation and transportation, sample preparation and analysis). These Quality Controls are directly related to data quality and control procedures of national IMAP competent laboratories, which include the accreditation process, use of certified reference material or standardized monitoring protocols, participation of laboratory to proficiency testing, etc., and elaborated in the Monitoring Guidelines/Protocols for Analytical Quality Assurance for IMAP Common Indicators 13, 14, 17, 18 and 20 (UNEP/MED 492/7) for consideration during present Meeting.

22.     It should be noted, that the IMAP (Pilot) Info System has been designed to further implement higher level Quality Controls, as elaborated above, as well as to collect additional information on laboratory data quality and control procedures and implementation of Monitoring Guidance/ Protocols as discussed and agreed by the Integrated Meetings of the Ecosystem Approach Correspondence Groups on IMAP Implementation (CORMONs) held from 1-3 December 2020 and the present Meeting of the Ecosystem Approach Correspondence Group on Pollution Monitoring. Such information will be included in specific DDs and DSs and linked to monitoring data in order to apply a categorization for flagging data sets for EO5 and EO9 (i.e. Category A, Category B, Category C, Category D, Category E), as provided in UNEP/MAP 2019b (UNEP/MED WG. 492/Inf.14).

23.     It should be noted that the migration of data from the Monitoring MED POL Database to IMAP Pilot Info System has been completed, therefore providing an access to monitoring data in the format of IMAP (Pilot) Info System Data Dictionaries. Furthermore, reporting of data was continued during the testing phase of IMAP Info System, as well as since being launched in July 2020.

Data quality organizational levels

24.     In order to guarantee the quality of the IMAP (Pilot) Info System, and well as the previous MED POL Database, the relevant roles and responsibilities in terms of database quality management have been defined (i.e. from the sample collection until the use of the final validated data) to ensure that the quality chain is followed by the Contracting Parties.

25.     There are basically three groups of stakeholders within the data management system, as elaborated in UNEP/MAP, 2019b (UNEP/MED WG. 492/Inf.14). Namely, the Contracting Parties' IMAP competent laboratories (i); the ministry or delegated national agency with the responsibility to report monitoring data to IMAP (Pilot) Info System (ii) on behalf of the respective MED POL Focal Points (iii), corresponding to a primary, secondary and tertiary levels in the data quality chain.

26.     Each level has a different degree of responsibility to fulfil the 'data quality' attributes to ensure the usefulness of the monitoring data at national and regional scales within the implementation of IMAP. These three organizational levels of responsibilitiy for 'data quality' management and data flows, provide the basis for a common understanding of the 'data quality' requirements and serve to the establishment of the 'data quality' categories.

## 2.     Technical Note for reporting Monitoring Data for IMAP Common Indicators 13, 14, 17, 18 and 20

27.     This Technical Note interrelates the procedures for reporting of monitoring data with the Data Standards (DSs) and Data Dictionaries (DSs)[6] as agreed and built into IMAP (Pilot) Info System for IMAP Common Indicators 13, 14 and 17, as well as defines the elements for data reporting for IMAP Common Indicators 18 and 20 in order to guide ongoing preparation of the Data Standards (DSs) and Data Dictionaries (DSs) for IMAP Common Indicators 18 and 20. To that effect, under this Technical Note, this Monitoring Guideline provides the following IMAP Protocols for reporting of monitoring data:

- Protocol for reporting Monitoring Data for IMAP Common Indicators 13 and 14;
- Protocol for reporting Monitoring Data for IMAP Common Indicators 17;

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[6] DSs and DDs are a set of information describing the content, format and structure of a database and relationship between the elements. DSs are prepared in a form of Excel spreadsheets in which every row indicates a field to be filled by the data providers, aligned with the current MED POL Database for the common cases. The DSs are accompanied by DDs provided in a form of a column next to each Data Standard or excel spreadsheet to guide the data provider.

    – Protocol for reporting Monitoring Data for IMAP Common Indicators 18; and
    – Protocol for reporting Monitoring Data for IMAP Common Indicators 20.

## 2.1. Protocol for Reporting Monitoring Data for IMAP Common Indicators 13 and 14

28.    Considering the already developed DSs and DDs for CI13 and CI14 (UNEP/MAP 2019c), being built into IMAP Info System, as well as the IMAP Guidance factsheets for CI13 and CI14 (UNEP/MAP (2019b), the following two procedures on reporting monitoring data related to IMAP CI13 and CI14 needs to be applied: a) reporting data related to sampling stations, and b) reporting data related to eutrophication.

29.    *The DSs and DDs for stations* for CIs 13 and 14 are structured around data sets that are defined as mandatory in relevant IMAP Guidance Factsheets. Therefore, there is a need to report the following data: i) country code; ii) national station ID; iii) national station name; iv) latitude and longitude of station; vi) TCM matrix-water column; vii) station distance from the coast in km; viii) bottom depth in meters, and ix) typology of the monitored area (R = Reference, C = Coastal, HS = Hot spot, O = Other) and x) Remarks (notes). However, there is also a possibility to fill in non-mandatory data (i.e. region - adminstrative subdivision of first level to which the station belongs and pressure type) as to allow for the CP that already have monitoring systems in place collecting a wider set of data to also report them as additional data sets.

30.    *The DDs and DDs for eutrophication* are structured around data sets related to CIs 13 and 14 that are defined as mandatory parameters in relevant IMAP Guidance Factsheets. Specifically, there is a need to report data related to i) country code as ISO two digits; ii) national station ID; iii) year, month, day and time of sampling; vii) sample code; viii) name of the physico-chemical parameter or of the nutrient; ix) unit of measurement of the physico-chemical parameter or nutrient; x) LOD_LOQ_flag; xi) concentration measure; xii) sample depth in meters and xiii) analytical method in line with IMAP, as a variety of methods exists (e.g. Chlorophyll a concentration - spectrophotometer, fluorometer, HPLC, in situ) for measurements with different underlying variability, along with a coding list for the used Analytical Methods, corresponding to a combination of analyte and methods.

31.    Annex I provides both DDs for reporting on CIs13 and 14 for stations and eutrophication mandatory parameters as follows: Table 1. Station Information; Table 2. Physicochemical information; Table 3. List of physicochemical parameters, as they have been approved by the 7th Meeting of the Ecosystem Approach Coordination Group, held on 9 September 2019 (Athens, Greece), and consequently made operational for data reporting within IMAP Pilot Info System.

## 2.2. Protocol for Reporting Monitoring Data for IMAP Common Indicators 17

32.    Considering that the already developed DSs and DDs for CI17 (UNEP/MAP 2019c) are being built into IMAP Pilot Info System, as well as the IMAP Guidance Factsheets for CI17 (UNEP/MAP (2019b), the following two procedures on reporting monitoring data related to IMAP CI17, need to be applied: a) reporting data related to sampling stations and b) reporting data related to contaminants.

33.    *The DSs and DDs for stations* for CI 17 are structured around data sets that are defined as mandatory in relevant IMAP Guidance Factsheet. Therefore, there is a need to report the following data: i) country code; ii) national station ID; iii) national station name; iv) latitude and longitude of station; vi) TCM matrix (Biota, Sediment, Seawater or a combination of these matrices); vii) bottom depth in meters; viii) typology of the monitored area (R = Reference, C = Coastal, HS = Hot spot, O = Other) and pressure type (IP = industrial plants, MT = Maritime Traffic). However, there is also a possibility to fill in non-mandatory data i.e. region - adminstrative subdivision of first level to which the station belongs and closest coast in km as to allow for the CP that already have monitoring systems in place collecting a wider set of data to also report them as additional data sets.

34.    *The DDs and DDs for contaminants* are structured around data sets related to CI 17 that are defined as mandatory parameters in related IMAP Guidance Factsheets (UNEP/MAP, 2019b). Specifically, there is a need to report data related to: i) country code as ISO two digits; ii) national station ID; iii) year, month, day and time of sampling; vii) sample ID - code; viii) sample matrix (seawater, sediment, biota); ix) name of the contaminant (Label in list of contaminants); x) ID of the

contaminant (ID in list of contaminants); xi) CAS number of the contaminant; xii) unit of measurement of the contaminant; xiii) dry (DW) or wet weight (WW) for sediment and biota; xiv) <LOD_<LOQ_flag; xv) concentration value; xvi) sample depth in meters and xvii) salinity (psu) and temperature (°C); xviii) dissolved oxygen concemtration; xix) sediment fraction (max size in μm); xx) sediment depth in m; xx) biota species ID (ID list_species); xxi) biota species name (Label List_species); xxii) specimen length in cm and specimen length standard deviation (specimens in pool in cm); xxiii) specimen weight in g and specimen weight standard deviation (specimens in pool in g); xxiv) pooling (content of pooling and number of specimens); xxv) extractable organic matter in mg g$^{-1}$; xxvi) tissue (for biota – fluids, eggs, tissues, kidney, liver, muscle, other, soft tissues); xxvii) fat content (percentage of total wet matter); xxviii) analytical method in line with IMAP, as a variety of methods exists (e.g. metal concentration – AAS, GC-AAS, ICP-MS; organic contaminant concentration – GC-ECD, GC-MS, HPLC) for measurements with different underlying variability, along with a coding list for the used Analytical Methods, corresponding to a combination of analyte and methods; xxix) LOQ; xxx) Emodnet codeP01 (code of the parameter/EMODNet method according to List_dictionary_P01); xxxi) Remarks (notes). There is also a possibility to fill in non-mandatory data (i.e. for sediment matrix: grain type, Total Carbon %, Total Organic Carbon %, Total Inorganic Carbon %, Total Nitrogen %) as to allow for the CP that already have monitoring systems in place collecting a wider set of data to also report them as additional data sets.

35.    The list of reference for the CI 17 on chemicals, which is also in use by the European Environmental Agency (EEA, WISE-Marine) includes either the CAS numbers (Chemical Abstract Service reference number) or the EEA reference number (for particular EEA requirements). The mandatory reporting is foreseen only for the biota and sediment matrices as agreed under IMAP Guidance Factsheets (UNEP/MAP, 2019b) and for specific compounds under each Common Indicator, despite any other substance and matrix can be reported by applying then harmonized CAS number. For Biota matrices, a list with the codes of reference species is provided in Annex I.

36.    Annex I provides both DDs for Reporting on CI17 for stations and contaminants mandatory parameters as follows: Table 4. Station Information; Table 5. Contaminants information; Table 6. List of mandatory contaminants; Table 7. List of reference species, as they have been approved by the 7$^{th}$ Meeting of the Ecosystem Approach Coordination Group, held on 9 September 2019 (Athens, Greece), and consequently made operational for data reporting within IMAP Info System.

## 2.3.    Protocol for Reporting Monitoring Data for IMAP Common Indicators 18

37.    The DSs and DDs specific for CI18 Stations and Contaminants are under preparation by UNEP/MAP (MEDPOL and INFO/RAC). In line with the structure and content of DDs for CI17, the present document provides elements for building DSs and DDs for CI18, as provided in Annex II. Similarly to procedure established for CIs 13, 14 and 17, the following two procedures on reporting monitoring data related to IMAP CI18 are proposed: a) reporting data related to sampling stations and b) reporting data related to biomarkers.

38.    *The proposed DSs and DDs for stations and parameters* related to CI18 are structured around data sets that are defined as mandatory in relevant IMAP Guidance Factsheet. Annex II provides both proposals of DDs for Reporting on CI18 for stations and biomarkers mandatory parameters as follows: Table 1. Station Information, Table 2. Biomarker informations, Table 3. List of mandatory biomarkers and Table 4. List of reference species. The organisms that should be analysed are for molluscs the *Mytilus* sp.and for fish *Mullus barbatus*.

39.    In line with above protocol for reporting monitoring data for IMAP CI 18, the elements of Data Standards (DS) and Data Dictionaries (DDs) specific for CI 18 are prepared, as presented in Annex II, for receiving the suggestions of present Meeting and guiding further work of INFO/RAC and MEDPOL.

## 2.4.    Protocol for Reporting Monitoring Data for IMAP Common Indicators 20

40.    Taking into consideration already developed DSs and DDs for CI17 (UNEP/MAP 2019c), as well as the IMAP Guidance factsheets for CI20 prepared by UNEP/MAP (2019b), the following two

procedures on reporting monitoring data related to IMAP CI20 are proposed: a) reporting data related to sampling stations and b) reporting data related to contaminants.

41.     *The DSs and DDs for stations* related to CI20 are structured around data sets that are defined as mandatory in relevant IMAP Guidance Factsheet. Sampling stations may be at sea (on board of a fishing boat) or on land (fishing port or fish market). Therefore, each seafood sampling lot must be traced back unambiguously to the sub-region where the organisms were initially captured. Therefore, DDs for stations should include information as for CI17, in order to be able to relate environmental quality data (CI17) with seafood safety data (CI20): i) Country code; ii) Station code (sampling); iii) Station name (sampling); iv) Station geographical coordinates (sampling); v) Seafood species; vi) Station code (where seafood samples were initially captured); vii) Station name (where seafood samples were initially captured); viii) Station geographical coordinates (where seafood samples were initially captured) and ix) Additional information on the area of organism's capture (such as fishing area code, area name, coordinates, date of fishing, etc.)

42.     *The DDs and DDs for contaminants* related to CI 20 for characteristic parameters including contaminants information and the List of reference are not yet developed for CI20, but they can be based on the DDs (contaminants information), which have been developed by INFO/RAC and MED POL for CI17 (UNEP/MAP 2019c).

43.     The list of reference for the CI 17 on chemicals is also in use by the European Environmental Agency (EEA, WISE-Marine) and includes either the CAS numbers (Chemical Abstract Service reference number) or the EEA reference number (for particular EEA requirements). The IMAP Guidance Factsheet related to CI 17 contains the agreed chemical compounds and those can be found in the EEA list with its CAS number. The mandatory reporting is foreseen only for the biota and sediment matrices as agreed under relevant IMAP Guidance Factsheets and for specific compounds under each Common Indicator, despite any other substance and matrix can be reported by applying then harmonized CAS number. For Biota matrices, a list with the codes of reference species is provided.

44.     For the CI20, contaminants' levels should also be expressed in absolute figures and not only in relation to the regulatory level (i.e. above or below the regulatory level). Regulatory levels for the protection of human heath as presented in EU Regulations (EC) No 1881/2006, (EC) No 835/2011 and EC No 1259/2011 (Annex III) are usually high in relation to the normal ambient concentrations of contaminants in marine organisms. However, recording the absolute concentration (and not the relative above/below the regulatory level information) triggers a warning signal in the event of an ascending trend of contaminants concentrations, even if these concentrations are still below the regulatory limit. It has to be underlined that concentrations below regulatory levels are not necessarily indicators of good environmental status, since environmental effects might be present at lower concentrations (JRC, 2010). Furthermore, recording the absolute concentration of pollutants generate data for contaminants, which may not be regulated yet but which might be regulated in the future.

45.     The concentration limits for the regulated contaminants in the EU are presented in a concise format in Annex III. The list of contaminants includes Cd, Hg, Pb, four PAHs (benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene) , dioxins, dioxin-like and non dioxin-like PCBs and radionuclides. Non-regulated contaminants could be included in the CI20 monitoring programme, but for the time being no concentration limits are set in the EU legislation.

46.     Integration of monitoring data for CI20 should be made with care. JRC (2010) suggests to take into account "the frequency that levels exceed the regulatory levels, the actual levels that have been detected, the number of contaminants for which exceeding levels have been detected and in parallel the origin of the contamination (geological versus anthropogenic, local versus or long distance)". Also "further an intake assessment taking into account the importance in the human diet of the species showing the exceeding levels could be taken into account" (JRC, 2010). If regulatory levels are exceeded in one species, that doesn't mean that all seafood consumption from this sub-region is dangerous.

47. In line with above protocol for reporting monitoring data for IMAP CI 20, elements of Data Standards (DS) and Data Dictionaries (DDs) specific for CI 20 are proposed, as presented in Annex III, for receiving the suggestions of present Meeting and guiding further work of INFO/RAC and MEDPOL.

**Annex I**
**Data Standards and Data Dictionaries for IMAP Common Indicators 13, 14 and 17**

**ECOLOGICAL OBJECTIVE 5: Common Indicators 13 and 14**

**Table 1:** Data Dictionaries (stations information) for CI13 and CI14.

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Station code | |
| National Station Name | Station name | |
| Region | Administrative first level subdivision to which the station belongs to | |
| Latitude | Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). | |
| Longitude | Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893). | |
| Closest Coast | Station distance from the coast in km | |
| TCM Matrix | Measure of seawater at the station | W = Sea water column |
| Sea Depth | Sea depth in meters | |
| Area Typology | Typology of the monitored area enter one of the values in the list | R = Reference<br>C = Coastal<br>HS = Hot spot<br>O = Other |
| Pressure Type | If the monitoring station id dedicated to monitor pressure, indicate the typology of pressure monitored, enter one of the values in the list | AP = Aquaculture plant<br>RP = River Plume<br>UWWTP = Urban Waste Water Treatment Plant<br>IP = Industrial Plant<br>O = Others |
| Remarks | | |

*non-mandatory under IMAP Guidance Factsheets

**Table 2:** Data Dictionaries (physicochemical information) for EO5 Common Indicator 13 and 14.

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Station code | |
| Year | Year of sampling in AAAA format | |
| Month | Month of sampling in 1-12 format | |
| Day | Day of sampling in 1-31 format | |
| Time | Hour-minutes-seconds of sampling in HH:MM:SS format | |
| Sample ID | Sample Code if multiple replies are made with the same value as Year, Month, Day and Time | |
| Determin_Nutrients | Name of the physico-chemical parameter or of the nutrient, enter one of the values in the list in the "List_PhysicoChemical" | |

| Field | Description | List of values |
|---|---|---|
| Nutrients Seawater_unit | Unit of measurement of the physiochemical parameter or nutrient, enter one of the values in the list | % = Oxygen saturation<br>m = Secchi disks depth<br>pH = pH<br>°C = Temperature<br>µg/L = Chlorophyll *a*<br>µmol/L = Ammonium, Nitrate, Nitrite, Total Nitrogen<br>µmol/L = Dissolved Oxygen<br>µmol/L = Orthophosphate, Total Phosphorus<br>µmol/L= Orthosilicate<br>µS/cm = Conductivity |
| LOD_LOQ_Flag | Enter the value LOQ in case the concentration value is less than the quantification limit or the value LOD in case the concentration value is less than the detection limit. In the other cases, leave the field empty. | "LOQ = Concentration value below the quantification limit<br>LOD = Concentration value below detection limit |
| Concentration | Concentration measure | |
| Sample Depth | Sampling depth in meters | |
| Analytical Method | Analytical method<br>List of analytical methods, in line with IMAP, will be completed.<br>Suggestion to use code from List_P01 provided in an Excel file | |
| Remarks | | |

**Table 3**: List of physicochemical parameters under IMAP Guidance Factsheets EO5 and provided as mandatory in Data Dictionaries for Common Indicators 13 and 14.

| Field | Description | Remarks |
|---|---|---|
| Temperature (water) | Water Temperature (°C) | |
| Salinity | Salinity (psu) | |
| Conductivity | Conductivity (µS/cm) | |
| Dissolved oxygen | Dissolved Oxygen (µmol/L) | |
| Oxygen saturation | Dissolved Oxygen - saturation percentage (%) | |
| pH | pH | |
| Chlorophyll *a* | Chlorophyll-*a* (µg/L) | |
| Secchi disk depth | Secchi disk (m) | |
| Nitrate | Nitrate (µmol/L) | |
| Nitrite | Nitrite (µmol/L) | |
| Ammonium | Ammonium (µmol/L) | |
| Total phosphorus | Total Phosphorus (µmol/l) | |
| Orthophosphate | Orthophosphate (µmol/L) | |
| Total nitrogen | Total Nitrogen (µmol/L) | |
| Orthosilicate | Reactive silicate (µmol/L) | |

**ECOLOGICAL OBJECTIVE 9: Common Indicator 17**

**Table 4:** Data Dictionaries (Stations Information) for Common Indicator 17 within EO9.

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Sation code | |
| National Station Name | Station name | |
| *Region | Adminstrative subdivision after country which the station belongs to (according to the country subdivision) | |
| Latitude | Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). | |
| Longitude | Longiitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893). | |
| *Closest Coast | Station distance from the coast in km | |
| TCM Matrix | Environmental matrix measured in the station, enter one value of the list | B = Biota<br>BS = Biota and sediment<br>BSW = Biota, sediment and sea water column<br>BW = Biota and sea water column<br>S = Sediment<br>SW = Sediment and sea water column<br>W = Sea water column |
| Sea Depth | Sea depth in meters | |
| Area Tipology | Indicate the typology of the monitored area, enter one of the values in the list | R = Reference<br>C = Coastal<br>HS = Hot spot<br>O = Others |
| PressureType | If the monitoring station id dedicated to monitor pressure, indicate the typology of pressure monitored, enter one of the values in the list | IP = Industrial Plants<br>MT = Maritime Traffic |

*non-mandatory under IMAP Guidance Factsheets

**Table 5:** Data Dictionaries (contaminants information)

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Station code | |
| Year | Year of sampling in YYYY format | |
| Month | Month of sampling in 1-12 format | |
| Day | Day of sampling in 1-31 format | |
| Time | Hours-minutes-seconds of sampling in HH:MM:SS format | |

| Field | Description | List of values |
|---|---|---|
| Sample ID | Sample Code if multiple replies are made with the same value as Year, Month, Day and Time | |
| Matrix | Sample matrix, enter one value of the list | W = Water<br>S = Sediments<br>B = Biota |
| Determin Haz Subs Name | Name of the contaminant, enter one value of the column 'Label' of the list 'List contaminants' | |
| Determin Haz Subs ID | ID of the contaminant, enter one value of the column 'ID_Contaminant' of the list 'List_contaminants' | |
| CAS Number | CAS number of contaminant, enter one value of the column CAS Number of list 'List_contaminants' | |
| Haz Subs_unit | Unit of measurement for the contaminant, enter one value of the list | µg/l = water matrix<br>µg/kg = sediments and biota matrices |
| Haz Subs_WD | For sediment or biota, specify dry or wet weight, enter one value of the list | WW = Wet weight<br>DW = Dry weight |
| LOD_LOQ_Flag | Enter the value '<' in case the concentration value is less than the quantification limit or the value '[' in case the concentration value is less than the detection limit. In the other cases, leave the field empty. | <= Concentration value below the quantification limit<br>[= Concentration value below detection limit |
| Concentration | Concentration value. In the case of analytes sums in which at least one is not less than the LOQ, use the Concentration field with the sum of solely quantifiable analytes (i.e. not lower than the LOQ). In case the concentration value of the single analyte or all the analytes constituent the sum is less than the LOQ, the LOD_LOQ_Flag field and the Concentration field should be used as follows: in the case of a single analyte enter the value of LOQ/2; in the case of analytical additions, enter the zero value taking into account that the individual substances below the quantification limit do not contribute to the value of the sum. | |
| Sample Depth | Sampling depth in meters | |
| Salinity | For water matrix: Salinity (psu) | |
| Temperature | For water matrix: Temperature (°C) | |
| Dissolved oxygen | For water matrix: dissolved oxygen (µmol O2/l) | |

| Field | Description | List of values |
|---|---|---|
| *Grain Type | For sediment matrix: tipology of sediment, enter one value of the list | CS = Coarse Sand<br>FS = Fine Sand<br>G = Gravel<br>M = Mud<br>MS = Middle Sand |
| Fraction | Per sediment matrix: maximum size of sediment particles in μm | |
| Sediment Depth | For the sediment matrix: Depth of the collected sample of sediment, measured as a range, in centimeters, starting at the seafloor surface. The range would start by zero if the top of the sediment sample is the seafloor surface. For ex. insert '0-10' if 10 cm of sediments have been sampled starting from seafloor surface or insert '5-15' if 10 cm of sediments have been sampled starting from 5 cm from the seafloor surface. | |
| *TC | For sediment matrix: Total carbon content in % unit | |
| *TOC | For sediment matrix: Total organic carbon in % unit | |
| *TIC | For sediment matrix: Total inorganic carbon in % unit | |
| *TN | For sediment matrix: Total nitrogen content in % unit | |
| Species ID | For the biota matrix: monitored species. Enter one value of the column 'ID_Species' of the list 'List_species' | |
| Species Name | For the biota matrix: monitored species. Enter one value of the column 'Label' of the list 'List_species' | |
| Specimen_lenght | For the biota matrix: length of specimen in cm. In case of pooling, indicate mean length | |
| Specimen_length_sd | For the biota matrix: Standard deviation of average length of specimens in a pool in cm. | |
| Specimen_weight | For the biota matrix: weight of specimen in g. In case of pooling, indicate mean weight. | |
| Specimen_weight_sd | For the biota matrix: Standard deviation of average weight of specimens in a pool in g. | |
| Pooling | In case of pooling, describe the content of pooling as number of specimens and other methodological issues | |
| Extractable Organic Matter | Extractable Organic Matter in mg/g | |

| Field | Description | List of values |
|---|---|---|
| Tissue | For biota matrix: tissue element of the monitored species, enter one of the list values | **BL** = Fluids - Blood. Includes haemolymph, erythrocytes, haemocytes, serum (blood component without cells and clotting factors) and plasma (serum including clotting factors)<br>**EG** = Eggs. Includes bird eggs and fish eggs (roe). Use the remarks field to provide additional information, if necessary.<br>**FA** = Tissues - Fat. Any type of adipose tissue or organ. Includes the form code BB for "Blubber".<br>GO = Organs - Gonads. Includes female gonads (ovaries) and male gonads (testes). Use the remarks field to provide additional information, if necessary.<br>**KI** = Organs - Kidney. Use the remarks field to provide additional information, if necessary.<br>**LI** = Organs - Liver. Includes hepatopancreas. Use the remarks field to provide additional information, if necessary.<br>**MU** = Tissues - Muscle. Any type of muscle tissue or organ. Includes the former code TM for "Tail muscle".<br>**OT** = Other. Use the remarks field to provide additional information, if necessary.<br>**ST** = Tissues - Soft tissue. Includes any body tissue except mineralized tissue (hard tissue) |
| Fat Content | Fat content as percentage of total wet matter | |
| Analytical Method | Analytical method | |
| LOQ | Limit of quantification | |
| EmodnetCodeP01 | Code of the parameter/ EMODNet method according to the dictionary P01,enter one value of the list "List_dictionary_P01" | |
| Remarks | Notes | |

*non-mandatory under IMAP Guidance Factsheets

**Table 6:** Example of the List of physicochemical parameters under IMAP Guidance Factsheets EO9, that are also available in the EEA reference list of contaminants (Code list), showing compounds provided as mandatory in the Data Dictionaries for Common Indicator 17 (PAHs not shown). The full list is provided with related Excel files presented at the IMAP Best Practices Meeting.

| ID_Contaminant | Label | CAS Number | Matrix | Mandatory | Additional |
|---|---|---|---|---|---|
| CAS_309-00-2 | Aldrin | 309-00-2 | Sediments | Y | |
| CAS_7429-90-5 | Aluminium and its compounds | 7429-90-5 | Sediments | Y | |
| CAS_7440-43-9 | Cadmium and its compounds | 7440-43-9 | Biota, Sediments | Y | |
| CAS_60-57-1 | Dieldrin | 60-57-1 | Sediments | Y | |
| CAS_58-89-9 | Gamma-HCH (Lindane) | 58-89-9 | Biota, Sediments | Y | |
| CAS_118-74-1 | Hexachlorobenzene | 118-74-1 | Biota, Sediments | Y | |
| CAS_7439-92-1 | Lead and its compounds | 7439-92-1 | Biota, Sediments | Y | |
| CAS_7439-97-6 | Mercury and its compounds | 7439-97-6 | Biota, Sediments | Y | |
| CAS_37680-73-2 | PCB 101 2,2',4,5,5'-pentachlorobiphenyl) | 37680-73-2 | Biota, Sediments | Y | |
| CAS_32598-14-4 | PCB 105 (2,3,3',4,4'-pentachlorobiphenyl) | 32598-14-4 | Biota, Sediments | Y | |
| CAS_31508-00-6 | PCB 118 (2,3',4,4',5-pentachlorobiphenyl) | 31508-00-6 | Biota, Sediments | Y | |
| CAS_35065-28-2 | PCB 138 (2,2',3,4,4',5'-hexachlorobiphenyl) | 35065-28-2 | Biota, Sediments | Y | |
| CAS_35065-27-1 | PCB 153 (2,2',4,4',5,5'-hexachlorobiphenyl) | 35065-27-1 | Biota, Sediments | Y | |
| CAS_38380-08-4 | PCB 156 (2,3,3',4,4',5-hexachlorobiphenyl) | 38380-08-4 | Biota, Sediments | Y | |
| CAS_35065-29-3 | PCB 180 (2,2',3,4,4',5,5'-heptachlorobiphenyl) | 35065-29-3 | Biota, Sediments | Y | |
| CAS_7012-37-5 | PCB 28 (2,4,4'-trichlorobiphenyl) | 7012-37-5 | Biota, Sediments | Y | |
| CAS_35693-99-3 | PCB 52 (2,2',5,5'-tetrachlorobiphenyl) | 35693-99-3 | Biota, Sediments | Y | |
| EEA_33-38-5 | Polychlorinated biphenyls(7 PCB: 28,52,101,118,138,153,180) | | Biota, Sediments | Y | |
| EEA_32-03-1 | Total DDT (DDT, p,p' + DDT, o,p' + DDE, p,p' + DDD, p,p') | | Biota, Sediments | Y | |
| CAS_7440-66-6 | Zinc and its compounds | 7440-66-6 | Biota, Sediments | | Y |

**Table 7:** Example of the List of available reference species (Code list) for Data Dictionaries and Data Standards of the IMAP (Pilot) Info System for EO9 (CI17 and CI20).

| Species code | Species |
| --- | --- |
| 2279156 | Holothuria tubulosa |
| 2357093 | Hoplostethus atlanticus |
| 2481126 | Larus |
| 2481156 | Larus glaucoides |
| 2481127 | Larus hyperboreus |
| 2409391 | Lepidorhombus whiffiagonis |
| 2419875 | Leucoraja naevus |
| 5213960 | Limanda limanda |
| 2301117 | Littorina littorea |
| 2415070 | Lophius budegassa |
| 2415075 | Lophius piscatorius |
| 2291262 | Lymnaea palustris |
| 2286995 | Macoma balthica |
| 5214420 | Mallotus villosus |
| 2415822 | Melanogrammus aeglefinus |
| 2415788 | Merlangius merlangus |
| 2415643 | Merluccius merluccius |
| 2415777 | Micromesistius poutassou |
| 5214022 | Microstomus kitt |
| 5214883 | Molva dypterygia |
| 5214880 | Molva molva |
| 5220008 | Monodon monoceros |
| 4284897 | Mullus barbatus |
| 7791733 | Mya arenaria |
| 7865139 | Mya truncata |
| 2333785 | Myoxocephalus scorpius |
| 8288896 | Mytilus edulis |
| 2285683 | Mytilus galloprovincialis |
| 2303019 | Nassarius reticulatus |
| 2226962 | Nephrops norvegicus |
| 5193449 | Nucella lapillus |
| 2286060 | Ostrea edulis |

**Annex II**
**Elements proposed for preparation of Data Standards and Data Dictionaries for**
**IMAP Common Indicator 18**

**Common Indicator 18**

**Table 1:** Data Dictionaries (Stations Information) for Common Indicator 18 within EO9.

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Station code | |
| National Station Name | Station name | |
| *Region | Administrative subdivision after country which the station belongs to (according to the country subdivision) | |
| Latitude | Latitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). | |
| Longitude | Longitude of the station in the WGS84 decimal degrees reference system with at least 5 digits (xx.xxxxx). Use positive values without '+' before numbers (for ex. 13.98078) for coordinates east of the of the Greenwich Meridian (0°) and negative values with '-' for coordinates west of the Greenwich Meridian (0°) (for ex. -2.6893). | |
| *Closest Coast | Station distance from the coast in km | |
| Sea Depth | Sea depth in meters | |
| Area Typology | Indicate the typology of the monitored area, enter one of the values in the list | R = Reference<br>C = Coastal<br>HS = Hot spot<br>O = Others |
| Pressure Type | If the monitoring station id dedicated to monitor pressure, indicate the typology of pressure monitored, enter one of the values in the list | IP = Industrial Plants<br>MT = Maritime Traffic |

*non-mandatory under IMAP Guidance Factsheets

**Table 2.** Biomarkers for which reporting of parameters is mandatory in the Data Dictionaries forCommon Indicator 18 in line with related IMAP Guidance Factsheet

| Biomarker | Organism | Tissue | Mandatory | Additional |
|---|---|---|---|---|
| Lysosomal membrane stability on cryostat sections | Fish | Liver | Y | |
| Lysosomal membrane stability on cryostat sections or *in vivo* determination | Mussel | Digestive gland (cryostat sections) / Haemocytes (*in vivo*) | Y | |
| Micronuclei frequency | Mussel / Fish | Haemocytes, gill cells / Erythrocytes | Y | |
| Acetylcholinesterase activity | Mussel / Fish | Gills / Muscle | Y | |

| Stress on stress | Mussel | | | Y |
|---|---|---|---|---|

**Table 3.** Data Dictionaries for providing mandatory information/parameters for Common Indicator 18as listed in Table 2

| Field | Description | List of values |
|---|---|---|
| Country Code | Enter member country code as ISO two digits, for example "IT" for Italy. | |
| National Station ID | Station code | |
| Year | Year of sampling in YYYY format | |
| Month | Month of sampling in 1-12 format | |
| Day | Day of sampling in 1-31 format | |
| Time | Hours-minutes-seconds of sampling in HH:MM:SS format | |
| Sample ID | Sample Code if multiple replies are made with the same value as Year, Month, Day and Time | |
| Sample Type | Wild / Caged (add information about the collection site) | |
| Sample Depth | Sampling depth in meters | |
| Salinity | Water Salinity (psu) | |
| Temperature | Water Temperature (°C) | |
| Dissolved oxygen | Water dissolved oxygen ($\mu$mol $O_2$/L) | |
| Species ID | Monitored species. Enter one value of the column 'ID_Species' of the list 'List_species', if present. | |
| Species Name | Monitored species. Enter one value of the column 'Label' of the list 'List_species'; if the species is not present in the List, enter the name of the species. | |
| Specimen_lenght | Length of specimen in cm. In case of pooling, indicate mean length | |
| Specimen_length_sd | Standard deviation of average length of specimens in a pool in cm. | |
| Specimen_weight | Weight of specimen in g. In case of pooling, indicate mean weight. | |
| Specimen_weight_sd | Standard deviation of average weight of specimens in a pool in g. | |
| Pooling | In case of pooling, describe the content of pooling as number of specimens and other methodological issues | |
| Tissue | Tissue used for biomarker analysis of the monitored species, enter one of the list values | **BL** = Fluids - Blood. Includes haemolymph, erythrocytes, haemocytes <br> **GO** = Organs - Gonads. Includes female gonads (ovaries) and male gonads (testes). Use the remarks field to provide additional information, if necessary. <br> **LI** = Organs - Liver. Includes digestive gland. Use the remarks field to provide additional information, if necessary. <br> **GI** = Organs - Gills. |

| | | |
|---|---|---|
| | | **MU** = Tissues - Muscle. Any type of muscle tissue or organ. Includes the former code TM for "Tail muscle". **OT** = Other. Use the remarks field to provide additional information, if necessary. **ST** = Tissues - Soft tissue. Includes any body tissue except mineralized tissue (hard tissue) |
| Remarks | Notes | |

**Table 4:** The List of available reference species (Code list) for Data Dictionaries and Data Standards ofthe IMAP (Pilot) Info System for EO9 (CI17, CI18 and CI20)

| Species code | Species |
|---|---|
| 2279156 | Holothuria tubulosa |
| 2357093 | Hoplostethus atlanticus |
| 2481126 | Larus |
| 2481156 | Larus glaucoides |
| 2481127 | Larus hyperboreus |
| 2409391 | Lepidorhombus whiffiagonis |
| 2419875 | Leucoraja naevus |
| 5213960 | Limanda limanda |
| 2301117 | Littorina littorea |
| 2415070 | Lophius budegassa |
| 2415075 | Lophius piscatorius |
| 2291262 | Lymnaea palustris |
| 2286995 | Macoma balthica |
| 5214420 | Mallotus villosus |
| 2415822 | Melanogrammus aeglefinus |
| 2415788 | Merlangius merlangus |
| 2415643 | Merluccius merluccius |
| 2415777 | Micromesistius poutassou |
| 5214022 | Microstomus kitt |
| 5214883 | Molva dypterygia |
| 5214880 | Molva molva |
| 5220008 | Monodon monoceros |
| 4284897 | Mullus barbatus |
| 7791733 | Mya arenaria |
| 7865139 | Mya truncate |
| 2333785 | Myoxocephalus Scorpius |
| 8288896 | Mytilus edulis |
| 2285683 | Mytilus galloprovincialis |
| 2303019 | Nassarius reticulatus |
| 2226962 | Nephrops norvegicus |
| 5193449 | Nucella lapillus |
| 2286060 | Ostrea edulis |

**Annex III**
**Elements proposed for preparation of Data Standards and Data Dictionaries for IMAP Common Indicator 20**

The elements of Data Standards (DS) and Data Dictionaries (DDs) specific for CI 20 are provided in the tabular format as presented here-below for receiving the suggestions of present Meeting and guiding further work of INFO/RAC and MEDPOL. They are based on the concentration limits for the contaminants regulated in the EU, as defined in EU Commission Regulations (EC) No 1881/2006[7], (EC) No 835/2011[8] and EC No 1259/2011[9].

**Maximum Levels of Heavy Metals – (EC) Regulation 1881/2006**

| | Foodstuffs | Maximum levels μg kg⁻¹ wet weight | | |
|---|---|---|---|---|
| | | Cadmium | Lead | Mercury |
| 1 | Muscle meat of fish (1) | 0.050 Excluding species listed in 2 and 3 | 0.30 | 0.50 Excluding species listed in 4 |
| 2 | Muscle meat of the following fish (1) anchovy (*Engraulis species*) bonito (*Sarda sarda*) common two-banded seabream (*Diplodus vulgaris*) eel (*Anguilla anguilla*) grey mullet (*Mugil labrosus labrosus*) horse mackerel or scad (*Trachurus species*) louvar or luvar (*Luvarus imperialis*) sardine (*Sardina pilchardus*) sardinops (*Sardinops species*) tuna (*Thunnus species, Euthynnus species, Katsuwonus pelamis*) wedge sole (*Dicologoglossa cuneata*) | 0.10 | | |
| 3 | Muscle meat of swordfish (*Xiphias gladius*) (1) | 0.30 | | |
| 4 | Muscle meat of the following fish: anglerfish (*Lophius species*) atlantic catfish (*Anarhichas lupus*) bonito (*Sarda sarda*) eel (*Anguilla species*) emperor, orange roughy, rosy soldierfish (*Hoplostethus species*) grenadier (*Coryphaenoides rupestris*) halibut (*Hippoglossus* | | | 1.0 |

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[7] Commission Regulation (EC) No 1881/2006, setting maximum levels for certain contaminants in seafood
[8] Commission Regulation (EC) No 835/2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuffs;
[9] Commission Regulation (EC) No 1259/2011, amending Regulation (EC) No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs

|   | | | | |
|---|---|---|---|---|
| | *hippoglossus*) <br> marlin (*Makaira species*) <br> megrim (*Lepidorhombus species*) <br> mullet (*Mullus species*) <br> pike (*Esox lucius*) plain <br> bonito (*Orcynopsis unicolor*) <br> poor cod (*Tricopterus minutes*) <br> portuguese dogfish (*Centroscymnus coelolepis*) <br> rays (*Raja species*) <br> redfish (*Sebastes marinus, S. mentella, S. viviparus*) <br> sail fish (*Istiophorus platypterus*) <br> scabbard fish (*Lepidopus caudatus, Aphanopus carbo*) <br> seabream, pandora (*Pagellus species*) <br> shark (all species) <br> snake mackerel or butterfish (*Lepidocybium flavobrunneum, Ruvettus pretiosus, Gempylus serpens*) <br> sturgeon (*Acipenser species*) <br> swordfish (*Xiphias gladius*) <br> tuna (*Thunnus species, Euthynnus species, Katsuwonus pelamis*) | | | |
| 5 | Crustaceans, excluding brown meat of crab and excluding head and thorax meat of lobster and similar large crustaceans | 0.50 | 0.50 | 0.50 |
| 6 | Bivalve molluscs | 1.0 | 1.5 | |
| 7 | Cephalopods (without viscera) | 1.0 | 1.0 | |

(1) Exclusion of liver. Where fish are intended to be eaten whole, the maximum level shall apply to the whole fish

**Maximum Levels ofBenzo(a)pyrene and sum of four PAHs (benzo(a)pyrene, benz(a)anthracene, benzo(b)fluorantheneand chrysene) Regulation No 835/2011 amending Regulation (EC) 1881/2006**

| Foodstuffs | Maximum levels ($\mu g\ kg^{-1}$ ) | |
| --- | --- | --- |
| | Benzo(a)pyrene | Sum of benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene and chrysene * |
| Bivalve molluscs (fresh, chilled or frozen) | 5.0 | 30.0 |

\* Lower bound concentrations are calculated on the assumption that all the values
of thefour substances below the limit of quantification are zero

**Maximum Levels of Dioxins and PCBs - Regulation (EC) 1259/2011 amending Regulation (EC) 1881/2006**

| Foodstuffs | Maximum levels | | |
| --- | --- | --- | --- |
| | Sum of dioxins (WHO-PCDD/F-TEQ) [1] | Sum of dioxins and dioxin-like PCBS (WHO-PCDD/F-PCB-TEQ) [1] | Sum of PCB28, PCB52, PCB101, PCB138, PCB153 and PCB180 (ICES 6) |
| Muscle meat of fish and fishery products and products thereof [2] with the exemption of: <ul><li>wild caught eel</li><li>wild caught fresh water fish, with the exception of diadromous fish species caught in fresh water</li><li>fish liver and derived products</li><li>marine oils</li></ul> The maximum level for crustaceans applies to muscle meat from appendages and abdomen. In case of crabs and crab-like crustaceans (*Brachyura and Anomura*) it applies to muscle meat from appendages. | 3.5 pg $g^{-1}$ wet weight | 6.5 pg $g^{-1}$ wet weight | 75 ng $g^{-1}$ wet weight |

(1) Dioxins (sum of polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), expressed as World Health Organisation (WHO) toxic equivalent usingthe WHO-toxic equivalency factors (WHO-TEFs)) and sum of dioxins and dioxin-like PCBs (sum of PCDDs, PCDFs and polychlorinated biphenyls (PCBs), expressed as WHO toxic equivalent using the WHO-TEFs). WHO-TEFs for human risk assessment based on the conclusions of the World Health Organization (WHO) (For TEF values see note 31, (EC) Regulation 1259/2011 – Annex 1.1.9.).

(2) Where fish are intended to be eaten whole, the maximum level shall apply to the whole fish.

**Annex IV**
**References**

UNEP/MAP, 2019. UNEP/MED WG.467/5. IMAP Guidance Factsheets: Update for Common Indicators 13, 14, 17, 18, 20 and 21: New proposal for candidate indicators 26 and 27.

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UNEP/MAP, 2019b. UNEP/MED WG.467/13. Schemes for Quality Assurance and Control of Data related to Pollution.

UNEP/MAP, 2019c. UNEP/MED WG.467/8. Data Standards and Data Dictionaries for Common Indicators related to Pollution and Marine Litter.

UNEP/MAP, 2019d. UNEP/MAP WG. 467/12. MAP Pilot Info System: Quality Assurance and Quality Controls.

Commission Regulation (EC) No 1881/2006, setting maximum levels for certain contaminants in Seafood.

Commission Regulation (EC) No 835/2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuffs.

Commission Regulation (EC) No 1259/2011, amending Regulation (EC) No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs.