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Agenda item 5: Conservation of Species and Habitats

5.3. Report of the multidisciplinary group of experts nominated by the Contracting Parties to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea

Report of the multidisciplinary group of experts nominated by the Contracting Parties to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea

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Introduction

1. At their 21st Ordinary Meeting (Tirana, Albania, 17-20 December 2019), the Contracting Parties, requested SPA/RAC to identify the first elements for elaborating the list of Reference of Pelagic Habitat Types in the Mediterranean Sea with a view to submitting them to the Contracting Parties at their 22nd Ordinary Meeting (Decision IG.24/14). They also requested SPA/RAC to establish a multidisciplinary group of experts nominated by the Contracting Parties to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea so that it can be used, where necessary, as a basis for identifying reference pelagic habitats to be monitored and assessed at the national level under the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria for consideration of COP 23.

1. In this context, following an invitation sent by SPA//RAC, the Contracting Parties nominated experts with expertise in field related to typology of pelagic habitats and monitoring using phytoplankton and zooplankton. The list of Multidisciplinary group members is attached as [Annex II](#) to the present report.

1. The group met online on the 5 of April 2023 to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea. The agenda of the meeting is attached as [Annex III](#) of the present report.

1. The meeting, while highlighting the necessity and importance of further work to develop indicators using phytoplankton and zooplankton, defined Biomass (Chl a, Carbon), Abundance, Size and Biovolume as parameters that can be used as key parameters to develop and compute pelagic habitats indicators.

1. The meeting confirmed that the modified classification of pelagic habitat types in the epipelagic layer (0-200m) proposed in UNEP/RAC/SPA (2013)¹ can be used, where necessary, as a basis for identifying reference pelagic habitats to be monitored and assessed at the national level under IMAP. This reference list could be further developed at national level to consider national features and specificities.

1. The meeting expressed the importance and necessity to continue for the next biennium the work of the Multidisciplinary group to advance in the development of the indicator based on the outcomes of relevant ongoing projects in the region (i.e., ABIOMMED) and in collaboration with Joint Research Centre (JRC).

1. The meeting recommended that the Contracting Parties who have not yet appointed members to the multidisciplinary group of experts to do so as soon as possible to allow to take advantage of the diversity of skills and expertise across the region.

2. The recommendations and decision of the Meeting are attached as [Annex I](#) to the present report.

¹ UNEP/RAC/SPA, 2013: http://www.rac-spa.org/nfp11/nfpdocs/working/WG_382_11_ENG_1706.pdf

Annex I

Conclusions and recommendations of the Multidisciplinary group of experts

**Conclusions and recommendations of the online meeting of the Multidisciplinary group of experts
(5 of April 2023)**

Definition of parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators

1. Overall, while there has been progress in developing indicators based on phytoplankton and zooplankton, continued research and development are needed to define these indicators and improve their usefulness for assessing and managing pelagic habitats.

2. First, the relationships between changes in these organisms and broader ecosystem health can be complex and variable depending on the pressure and the considered spatial and temporal scales. For example, in some cases, high phytoplankton abundance may be indicative of eutrophication and poor water quality, while in other cases, it may simply reflect natural seasonal variability and associated processes (e.g., winter convection in the north-western Mediterranean Sea). Therefore, more research is needed to define specific indicators that are the most informative for different types of pressures, to better understand and study how these indicators reflect to different pressures (at different spatio-temporal scales) and how they should be interpreted. In addition, there is a strong need for collaboration among experts from different scientific fields and marine regions to define common indicators and thresholds and, finally, to investigate the links between indicators, environmental variables, and anthropogenic pressures.

3. The main pressures identified so far on pelagic habitats are by order of importance:

- hydroclimatic conditions and shifts that should be considered in light of climate change;
- Eutrophication;
- Biological invasions;
- Contaminants (chemicals and marine litter);
- Overfishing;
- Aquaculture;
- Physical disturbance due to the influence of man-made structure (wind farms, desalination plants, hydrocarbon drilling, marinas etc.);
- Acidification;
- Maritime traffic.

4. As pelagic habitats are closely linked to several Ecological Objectives of the EcAp like EO5 Eutrophication and EO9 Pollution, it is important to enhance synergy and better integration among Ecological objectives (by improving data collection and sharing, data harmonization and interoperability, etc.)

5. Monitoring and assessing phytoplankton and zooplankton communities can be logistically challenging. Therefore, there is a need to develop efficient, harmonised and cost-effective monitoring methods that can be applied across the region. Specific workshops should be organised for harmonizing sampling strategies and protocols.

6. Long-term series of data are critical for using indicators based on phytoplankton and zooplankton effectively. Without sufficient long-term data, it is impossible to distinguish between natural

variability and anthropogenic impacts, making it challenging to identify trends or changes. It is also critical to provide associated metadata wherever available in to ensure the quality and comparability of the data collected over time to validate whether observed changes are not explainable by changes in acquisition techniques (e.g., to verify whether observed changes are not explainable by changes in methodologies (sampling techniques, sample processing, different analysts)).

7. ABIOMMED project, and in particular the Activity 2, is related to pelagic habitat and the use of the plankton communities to properly address the status of pelagic habitat and relevant spatio-temporal scales and pressures. Under this concept, ABIOMMED is expected to provide a comprehensive input and the essential resources to contribute to the development of relevant IMAP biodiversity indicators based on phytoplankton and zooplankton.

8. The following parameters can be used to effectively use these organisms as indicators:

- Biomass [Chla, Carbon]
- Abundance (per species/genus or groups)
- Size and biovolume

9. Setting thresholds is a difficult task and could be challenging (Varkitzi et al. 2018²). Using trends, i.e., considering plankton indicators as surveillance indicator (e.g., Shephard et al. 2015³ ; Bedford et al. 2018⁴) with the addition of expert knowledge following indicator computation, could be a reasonable alternative and was recently proposed by McQuatters-Gollop et al. (2022)⁵ for biodiversity assessment.

10. Monitoring frequency should be adapted to integrate Seasonal and long-term temporal variability and rely on existing data.

² Varkitzi, I., Francé, J., Basset, A., Cozzoli, F., Stanca, E., Zervoudaki, S. et al. (2018). Pelagic habitats in the Mediterranean Sea: A review of Good Environmental Status (GES) determination for plankton components and identification of gaps and priority needs to improve coherence for the MSFD implementation. *Ecological indicators*, 95, 203-218.

³ Samuel Shephard, Simon P. R. Greenstreet, GerJan J. Piet, Anna Rindorf, Mark Dickey-Collas, Surveillance indicators and their use in implementation of the Marine Strategy Framework Directive, *ICES Journal of Marine Science*, Volume 72, Issue 8, September/October 2015, Pages 2269–2277, <https://doi.org/10.1093/icesjms/fsv131>

⁴ Jacob Bedford, David Johns, Simon Greenstreet, Abigail McQuatters-Gollop, Plankton as prevailing conditions: A surveillance role for plankton indicators within the Marine Strategy Framework Directive, *Marine Policy*, Volume 89, 2018, Pages 109-115, ISSN 0308-597X, <https://doi.org/10.1016/j.marpol.2017.12.021>.

⁵ A. McQuatters-Gollop, L. Guérin, N.L. Arroyo, A. Aubert, L.F. Artigas, J. Bedford, E. Corcoran, V. Dierschke, S.A.M. Elliott, S.C.V. Geelhoed, A. Gilles, J.M. González-Irusta, J. Haelters, M. Johansen, F. Le Loc'h, C.P. Lynam, N. Niquil, B. Meakins, I. Mitchell, B. Padegimas, R. Pesch, I. Preciado, I. Rombouts, G. Safi, P. Schmitt, U. Schückel, A. Serrano, P. Stebbing, A. De la Torre, C. Vina-Herbon, Assessing the state of marine biodiversity in the Northeast Atlantic, *Ecological Indicators*, Volume 141, 2022, 109148, ISSN 1470-160X, <https://doi.org/10.1016/j.ecolind.2022.109148>.

11. Abiotic parameters should be measured at the same time to interpret the changes in plankton communities:

- Water Temperature
- Salinity
- Transparency
- Oxygen
- Turbidity
- pH
- Nutrients concentration
- Meteorological data (air temperature, precipitation, wind intensity and direction, etc.)

Elaboration of the List of Reference of Pelagic Habitat Types in the Mediterranean Sea

12. The meeting confirmed that the modified classification of pelagic habitat types in the epipelagic layer (0-200 m) proposed in UNEP/RAC/SPA (2013)⁶, can be used, where necessary, as a basis for identifying reference pelagic habitats to be monitored and assessed at the national level under IMAP.

13. The group of experts did not reach a conclusion concerning whether the typology defined for pelagic habitats will be computed at seasonal scale or more frequently over a given period (i.e., 6-year cycle) and recommended that the point be discussed in the future.

14. It will be necessary to phase the typology definition for pelagic habitats with the areas of assessment defined for other Ecological Objectives (EO 5 Eutrophication – EO 9 Pollution) given eutrophication and pollution can act as pressures that should be considered in coherent spatial scales.

15. Frequency of the sampling depends on the proposed typology, on the resources available and on plankton dynamics and should be adapted at a minimum to the temporal scale of the typologies used.

16. Satellite-derived products for chlorophyll-a are valuable tools for acquiring data offshore because they are regularly validated and calibrated with in-situ data and account for reprocessing phases undertaken by NASA and ESA. These products rely on look-up tables to convert satellite measurements into estimates of chlorophyll-a concentrations, making them an effective way to complement in-situ data collection. However, it is important to note that satellite-derived products have limitations, such as limited spatial and temporal resolution, and should be used in combination with in-situ data to provide a more comprehensive understanding of pelagic habitats. Different products developed for Eutrophication (Common Indicator 14) were provided for the QSR Med Assessment 2023. They concern distinct contracting parties and rely on CMEMS product, French products developed by Argans and Spanish products (for the Alboran Sea). Ongoing works aim to compare the results given by these different products on eutrophication assessment (Chl a – Common Indicator 14).

17. The Draft reference list of pelagic Habitat Types for the epipelagic layer (0-200m) is as follows:

⁶ UNEP/RAC/SPA, 2013: http://www.rac-spa.org/nfp11/nfpdocs/working/WG_382_11_ENG_1706.pdf

Draft reference list of pelagic Habitat Types for the epipelagic layer (0-200m)

	Pelagic Habitat Types	Water mass	Comments
A.1.	Reduced salinity water	coastal lagoons	WFD correspondence ⁷
A.2.	Variable salinity water – high surface or subsurface CHL (>3 mg/m ³)	estuaries, river plumes	Transitional waters with WFD correspondence ⁸ (Values should be revised)
A.3.	Marine water: neritic - medium surface or subsurface CHL (0.5-3 mg/m ³)	upwellings, re-suspension in shallow waters and outskirts of river plumes, winter mixing areas	WFD water type II, type III
A.4.a	Marine water: oceanic - medium surface or subsurface CHL (0.5-3 mg/m ³)	Upwellings, and winter mixing areas	WFD water type III
A.4.b	Marine water: oceanic - low to medium surface CHL (~0.1-1.0 mg/m ³)	Hydrological features (fronts and gyres)	WFD water type III
A.5.a.	Marine water: oceanic - very low surface CHL (<0.1 mg/m ³) with deep CHL maximum	euphotic depth > mixed layer depth	WFD water type III
A.5.b.	Marine water: oceanic - very low surface CHL (<0.2 mg/m ³) without deep CHL maximum	euphotic depth < mixed layer depth	WFD water type III

*Each country should specify the range of CHLa, Salinity, depth and if annual/seasonal values are used

⁷ European Commission Decision 2018/229/EU establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council, the values of the Member State monitoring system classifications as a result of the intercalibration exercise, and repealing Commission Decision 2013/480/EU (notified under document C (2018) 696) <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0229&from=PL>

⁸ WFD Annex 2 part 1.2.3. defines Transitional waters. see also Guidance document n.o 5 , Transitional and Coastal Waters, Typology, Reference Conditions and Classification Systems and Water Framework Directive Intercalibration Technical Report - Part 3: Coastal and Transitional Waters

Annex II
Members of the Multidisciplinary Group nominated by the Contracting Parties
(As per 5 April 2023)

Algeria	Nassima BOUDEFAOU Yasmina BELKACEM Assia OUALIKENE
Croatia	Sanda SKEJIĆ Natalia BOJANIC Živana NINČEVIĆ Hrvoje MIHANOVIĆ
France	Dorothee VINCENT Eric GOBERVILLE Anne GOFFART
Greece	Ioanna VARKITZI Kalliopi PAGOU Epaminondas CHRISTOU Soultana ZERVOUDAKI
Italy	Emanuela SPADA Patrizia BORRELLO Arianna ORASI
Slovenia	Janja FRANCE
Syria	Amir IBRAHIM Malek ALI Mouena BADRAN

Annex III
Agenda of the Meeting

Meeting of the Multidisciplinary group of experts nominated by the Contracting Parties to define parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators and elaborate the List of Reference of Pelagic Habitat Types in the Mediterranean Sea

Online, 5 April 2023

Provisional Agenda

Time is indicated in West Africa Time (WAT) / Central European Time (CET) / UTC+1. Participants are kindly requested to convert to their respective time zones, if different from WAT/CET.

Time	Agenda item	Responsible
8.00 - 11.00 <i>Comfort break (9.30-9.45)</i>	Agenda item 1 - Opening of the meeting <ul style="list-style-type: none"> ▪ Welcome and opening ▪ Adoption of the agenda and organization of work, including the election of the chair of the Multidisciplinary group of experts 	<ul style="list-style-type: none"> ▪ SPA/RAC ▪ All participants
	Agenda item 1 – Presentation of the ToRs of the Multidisciplinary group of experts	<ul style="list-style-type: none"> ▪ SPA/RAC ▪ Multidisciplinary group of experts Chair
	Agenda item 2 – Definition of parameters allowing to use phytoplankton and zooplankton for relevant IMAP biodiversity indicators	<ul style="list-style-type: none"> ▪ Multidisciplinary group of experts Chair ▪ Members ▪ SPA/RAC
11.00 - 12.00	<i>Lunch break</i>	
12.00 - 14.00 <i>Comfort break (13.00-13.15)</i>	Agenda item 3 – Elaboration of the List of Reference of Pelagic Habitat Types in the Mediterranean Sea	<ul style="list-style-type: none"> ▪ Multidisciplinary group of experts Chair ▪ Members ▪ SPA/RAC
14.00	Closure of the Meeting	<ul style="list-style-type: none"> ▪ Multidisciplinary group of experts Chair ▪ Members ▪ SPA/RAC