Table 3.1.3.3.3. Results of the assessment (G_NG.oN85 - the good status corresponds to all values below the 85th percentile set as G/M i.e., good/non-good boundary limit) of the CEN Sub-region by Assessment Zones (AZ) and Spatial Assessment Units (SAUs). Blue coloured SAUs indicate good status.

AZ	SAU	CHL_N	CHL_GM	oN50	oN50+50	oN10	oN85	G_NG.oN85
CW	CW_ECEN	26254	0,174	0,147	0,221	0,060	0,264	**G**
CW	CW_NCEN	8893	0,330	0,329	0,493	0,102	0,78	**G**
CW	CW_SCEN	300536	0,045	0,038	0,057	0,034	0,053	**G**
CW	CW_WCEN	44184	1,297	1,209	1,813	0,275	3,844	**G**
OW	OW_ECEN	99313	0,061	0,058	0,086	0,049	0,071	**G**
OW	OW_NCEN	154096	0,094	0,091	0,136	0,061	0,127	**G**
OW	OW_SCEN	80305	0,049	0,039	0,059	0,035	0,072	**G**
OW	OW_WCEN	46845	0,198	0,142	0,213	0,091	0,497	**G**

CHL_N – number of grid point in the SAU; CHL_GM – geometric mean (5-year average); oN50 – mean; oN50+50 – Mean + 50%; oN10 – 10th percentile (Reference conditions)

Table 3.1.3.3.4. Result of the assessment (G_NG.oN85- the good status corresponds to all values below the 85th percentile set as G/M i.e., good/non-good boundary limit) of the CEN Sub-region for the finest Spatial Assessment Units (subSAUs). Blue coloured subSAUs indicate good status; Red coloured status indicate non-good status.

Coun.	AZ	SAU	subSAU	CHL_N	CHL_GM	oN50+50	oN10	oN85	G_NG.oN85
GRE	CW	CW_ECEN	GREA	1702	0,167	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GREAMB	1303	4,8	0,221	0,06	0,264	NG
GRE	CW	CW_ECEN	GREB	6773	0,122	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GREC	1214	0,129	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GRED	3753	0,091	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GREISL	998	0,056	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GREKOR	8157	0,191	0,221	0,06	0,264	G
GRE	CW	CW_ECEN	GREPAT	2354	0,31	0,221	0,06	0,264	NG
ITA	CW	CW_NCEN	ITAIOA	1421	0,227	0,493	0,102	0,78	G
ITA	CW	CW_NCEN	ITAIOTAR	2630	0,382	0,493	0,102	0,78	G
ITA	CW	CW_NCEN	ITASCA	2784	0,615	0,493	0,102	0,78	G
ITA	CW	CW_NCEN	ITASCB	1535	0,198	0,493	0,102	0,78	G
MLT	CW	CW_NCEN	MLTC	523	0,071	0,493	0,102	0,78	G

Coun.	AZ	SAU	subSAU	CHL_N	CHL_GM	oN50+50	oN10	oN85	G_NG.oN85
LBY	CW	CW_SCEN	LBY_E	1170	0,097	0,057	0,034	0,053	NG
LBY	CW	CW_SCEN	LBY_SIR	296417	0,044	0,057	0,034	0,053	G
LBY	CW	CW_SCEN	LBY_W	2949	0,348	0,057	0,034	0,053	NG
TUN	CW	CW_WCEN	TUN_A	995	0,431	1,813	0,275	3,844	G
TUN	CW	CW_WCEN	TUN_B	43189	1,33	1,813	0,275	3,844	NG
GRE	OW	OW_ECEN	GREA	16138	0,076	0,086	0,049	0,071	NG
GRE	OW	OW_ECEN	GREB	32001	0,068	0,086	0,049	0,071	G
GRE	OW	OW_ECEN	GREC	18781	0,056	0,086	0,049	0,071	G
GRE	OW	OW_ECEN	GRED	14808	0,055	0,086	0,049	0,071	G
GRE	OW	OW_ECEN	GREISL	17585	0,05	0,086	0,049	0,071	G
ITA	OW	OW_NCEN	ITAIOA	23686	0,092	0,136	0,061	0,127	G
ITA	OW	OW_NCEN	ITAIOTAR	53598	0,114	0,136	0,061	0,127	G
ITA	OW	OW_NCEN	ITASCA	25605	0,112	0,136	0,061	0,127	G
ITA	OW	OW_NCEN	ITASCAI	22978	0,07	0,136	0,061	0,127	G
ITA	OW	OW_NCEN	ITASCB	13608	0,095	0,136	0,061	0,127	G
MLT	OW	OW_NCEN	MLTC	14621	0,057	0,136	0,061	0,127	G
LBY	OW	OW_SCEN	LBY_E	13675	0,04	0,059	0,035	0,072	G
LBY	OW	OW_SCEN	LBY_SIR	43480	0,038	0,059	0,035	0,072	G
LBY	OW	OW_SCEN	LBY_W	23150	0,089	0,059	0,035	0,072	NG
TUN	OW	OW_WCEN	TUN_A	14645	0,11	0,213	0,091	0,497	G
TUN	OW	OW_WCEN	TUN_B	32200	0,258	0,213	0,091	0,497	G

CHL_N – number of grid point in the SAU; CHL_GM – geometric mean (5 year average); oN50 – mean; oN50+50 – Mean + 50%; oN10 – 10^{th} percentile (Reference conditions);

The IMAP Environmental Assessment of the Western Mediterranean Sea (WMS) Sub-region

355. Given the lack of quality-assured, the assessment of Common Indicator 4: Chl a was undertaken in the three Sub-divisions of the Western Mediterranean Sub-region as follows: i) in the Central Sub-division of the Western Mediterranean Sea Sub-region (CWMS): the Waters of France; the Alboran (ALB) and the Levantine-Balearic (LEV-BAL) Sub-division: the Waters of Spain, and the Southern part of the Central Western Mediterranean Sea Sub-division: the Waters of Algeria, Morocco and Tunisia, by applying the Simplified G/M comparison assessment methodology on the satellite-derived Chl a data; and ii) the Tyrrhenian Sea Sub-division and part of CWMS Sub-division: the Waters of Italy by applying both the Simplified G/M comparison assessment methodology on the satellite-derived Chl a data and the simplified EQR assessment methodology on in situ measured data.

356. The assessment of the Common Indicator CI 14, based on the simplified G/M comparison method applied on the satellite-derived Chl a data, was harmonized at the level of the WMS.This simplified method has the advantage to overcome the lack of in situ data, relying on satellite-derived products for surface Chl a concentration at a daily frequency. Even though this assessment is useful to provide a picture at the regional scale, in some cases finer methods are available at the local scale. For the sake of consistency with scientific work undertaken at the national level, the assessment of the French part of CWMS, as well as assessment of the Spanish waters, also takes account of the comparison between the regional and national assessments, whereby in the case of discrepancy, precedence was given to the national scientific expertise[63].

Available data.

357. A detailed data analysis was performed for the Western Mediterranean Sea (WMS) in order to decide on the assessment methodologies that can be found optimal at the level of Sub-divisions given the present circumstances related to the lack of data reporting.

358. Table 3.1.3.4.1. informs on data availability in WMS by considering data reported in IMAP IS by 31st October, the cut-off date for data reporting. Figure 3.1.3.4.1 shows the locations of sampling stations in the WMS Sub-region

[63] HERLORY O., BRIAND J. M., BOUCHOUCHA M., DEROLEZ V., MUNARON D., CIMITERRA N., TOMASINO C., GONZALEZ J.-L., GIRAUD A., BOISSERY P. (2022) Directive Cadre sur l'Eau. Bassin Rhône Méditerranée Corse - Année 2021. RST.ODE/UL/LER-PAC/22-11. 89pp. https://archimer.ifremer.fr/doc/00820/93161/99746.pdf

Table 3.1.3.4.1. Data availability by country and year for the Western Mediterranean Sea Sub-region (WMS) Sub-region showing data reported by the CPs for the assessment of EO5 (CI 13 and CI 14) up to 31st Oct 2022.

Country	Year	Amon	Ntri	Ntra	Phos	Tphs	Slca	Cphl	Temp	Psal	Doxy
Algeria	2016-2021	No data provided									
France	2016	-	-	-	-	-	-	130	179	179	74
	2017	66	-	66	66	-	43	130	324	340	116
	2018	56	-	56	56	-	56	129	326	326	108
	2019	126	-	126	126	-	126	126	344	342	117
	2020	102	-	102	102	-	95	120	349	350	129
Morocco	2016-2021	No valid data provided									
Italy	2015-2020	By 31st October 2022, Italy reported data relevant to the WMS Sub-region, in 4 data files with all together 1,081,853 data points up to 2019. On 17 Nov 2022 data for 2020 were also provided. It should be noted that quantum of data reported guarantees a near monthly sampling frequency on 27 profiles with 4 stations in the 5-year period. All IMAP mandatory parameters were measured.									
Spain	2019	8	86	86	95	-	-	95	95	95	95
	2020	306	311	311	295	-	-	290	304	304	310
	2021	300	300	300	141	-	-	294	302	302	302
	2022	274	322	322	168	-	-	291	318	318	318
Tunisia	2016-2021	No data provided									

Amon - Ammonium; Ntri- Nitrite; Ntra – Nitrate; Phos – Orthophosphate; Tphs—Total phosphorous; Slca – Orthosilicate; Cphl – Chlorophyll *a*; Temp – temperature; Psal – Salinity; Doxy – Dissolved Oxygen.

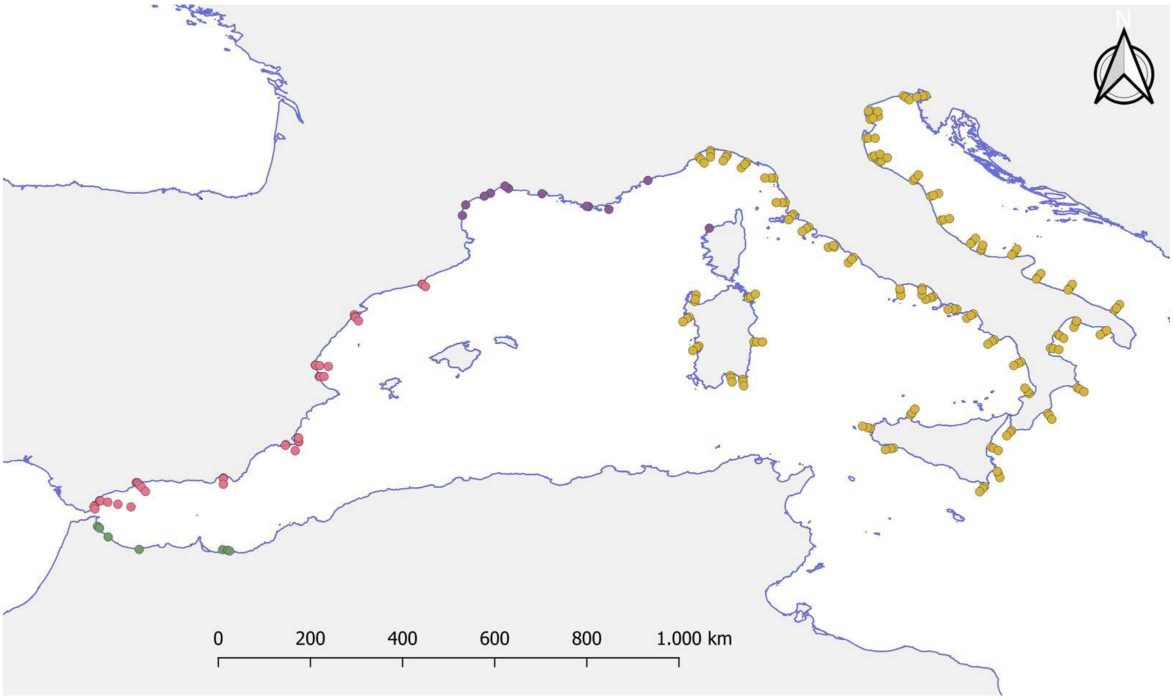

Figure 3.1.3.4.1. The locations of sampling stations in the WMS Sub-region

359. As explained for the AEL and CEN, given the above explained status of data reported in the WMS, in particular the lack of homogenous and quality assured data reported in line with IMAP requirements, the use of alternative data sources i.e. the satellite-derived data was explored. For Spanish waters, remote sensing data for surface Chl a concentrations in the Alboran Sea and the Levantine-Balearic Sub-divisions were received from the SMED algorithm (Gómez-Jakobsen et al,

2018), by combining data from the sensors MODIS-Aqua and VIIRS-SNPP in a coherent way, according with the procedure published in Gómez-Jakobsen et al. 2022. Chl a data for French waters were provided by ARGANS France. Data sets consists of Level 4 monthly values of concentration of Chl a with a resolution of 1 x 1 km for the period from April 2016 to March 2021. The file format was NetCDF-4 (.nc). Chl a concentration data were daily evaluated via the OC5 algorithm developed by IFREMER and maintained/improved by ARGANS.

360. For the Southern part of the Central Western Mediterranean Sea Sub-division, data were also provided by ARGANS France.

361. For Italian waters, the Copernicus satellite Chl*a* dataset were used. The Copernicus services - the Mediterranean Sea Ocean Satellite Observations, the Italian National Research Council (CNR – Rome, Italy), elaborated the Bio-Geo_Chemical (BGC) regional datasets. Chl a concentration (CHL) were evaluated via region-specific algorithms (Case 1 waters: Volpe et al., 201964, with new coefficients; Case 2 waters, Berthon and Zibordi, 2004[65]), and the interpolated gap-free Chl concentration (to provide a ”“cloud free”″ product) was estimated by means of a modified version of the DINEOF algorithm (Volpe et al., 2018[66]).

362. Using only satellite-derived Chl *a* data, with a good geographical coverage (1 x 1 km) and high sensing frequency (daily), a simple assessment methodology was applied based on the ecological rules and a comparison of the obtained values to the defined Good/Moderate (G/M) boundary.

363. Data elaboration was performed by using R, an open-source language widely used for statistical analysis and graphical presentation (R Development Core Team, 2022)[67.] Maps are elaborated using QGIS 3.28, an open-source GIS tool.

364. The transfer and data elaboration were time demanding as data were comprised of i) 8,840,786 data records for the Spanish waters; and ii) 17,319 data points and 1,059,486 observations for the French Waters, and 31,507 data points and 1,941,429 observations for the Southern part of the CWMS, altogether extracted from a WMS dataset consisting of 46,277,527 observations. For the elaboration of Tyrrhenian data 64,851 data point were used pertaining to 3,678,959 observation and extracted from 22,269,588 observations.

365. The parameter values were expressed in μg/L of Chl a, for the geometric mean (GM) calculated over the year in at least a five-year period as required in the COMMISSION DECISION (EU) 2018/22968. These GM annual values were later used as a metric for the development of the

[64] Volpe, G., Colella, S., Brando, V. E., Forneris, V., Padula, F. L., Cicco, A. D., ... & Santoleri, R. (2019). Mediterranean ocean colour Level 3 operational multi-sensor processing. Ocean Science, 15(1), 127-146
[65] Berthon, J.-F., Zibordi, G. (2004) Bio-optical relationships for the northern Adriatic Sea. Int. J. Remote Sens., 25, 1527-1532.
[66]Volpe, G., Buongiorno Nardelli, B., Colella, S., Pisano, A. and Santoleri, R. (2018). An Operational Interpolated Ocean Colour Product in the Mediterranean Sea, in New Frontiers in Operational Oceanography, edited by E. P. Chassignet, A. Pascual, J. Tintorè, and J. Verron, pp. 227–244
[67] R Development Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0. http://www.R-project.org
[68] Commission Decision (EU) 2018/229 of 12 February 2018 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.

assessment criteria and present assessment of CI 14. An annual GM[69] value was calculated for every point of the satellite derived Chl a data grid as shown in Figure 3.1.3.4.2.a. for the French waters; Figure 3.1.3.4.2.b. for the Southern part of the WMS; Figure 3.1.3.4.2.c. for the Spanish waters and Figure 3.1.3.4.2.d. for the Italian wasters.

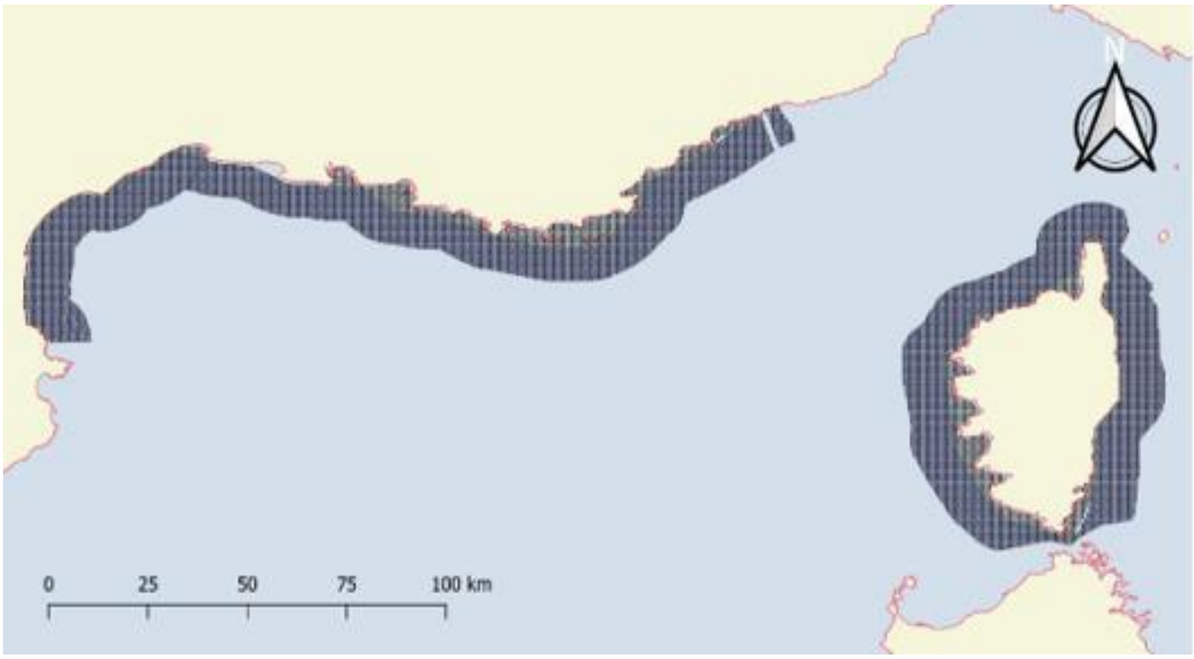

Figure 3.1.3.4.2.a. The French part of the Central Western Mediterranean Sea Sub-division (CWMS): The dots in the Assessment Zones represent data in the grid (1 x 1 km).

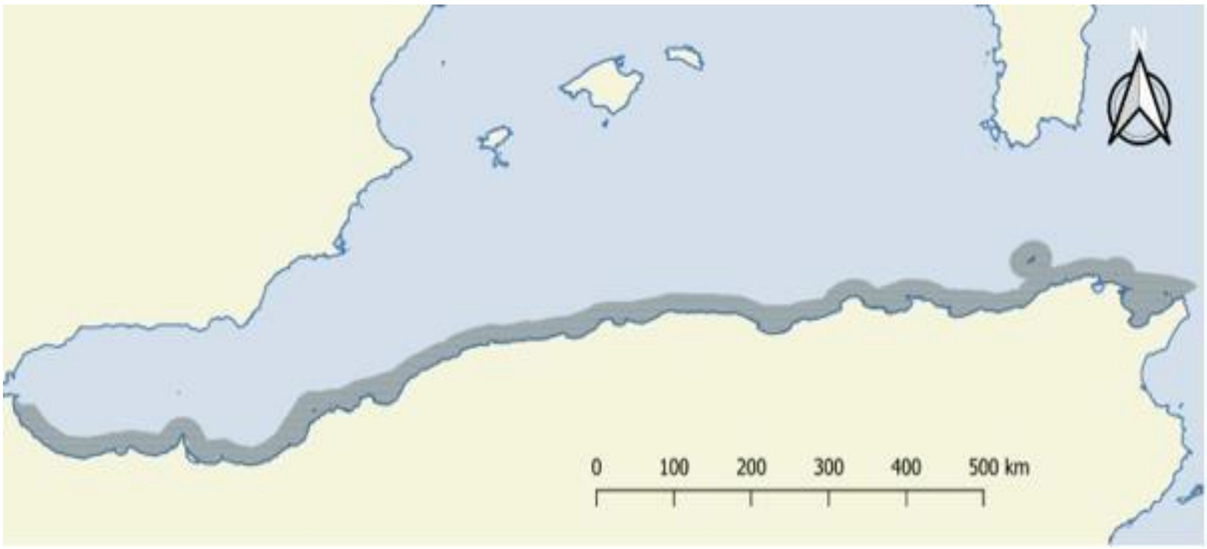

Figure 3.1.3.4.2.b. The Southern part of the Central Western Mediterranean Sea Sub-division (CWMS) - the Waters of Algeria, Morocco and Tunisia: The dots in the Assessment Zones represent data in the grid (1 x 1 km).

[69] Attila, J., Kauppila, P., Kallio, K.Y., Alasalmi, H., Keto, V., Bruun, E and Koponen, S. Applicability of Earth Observation chlorophyll-a data in assessment of water status via MERIS — With implications for the use of OLCI sensors. Remote Sensing of Environment 212 (2018) 273–287. https://doi.org/10.1016/j.rse.2018.02.043

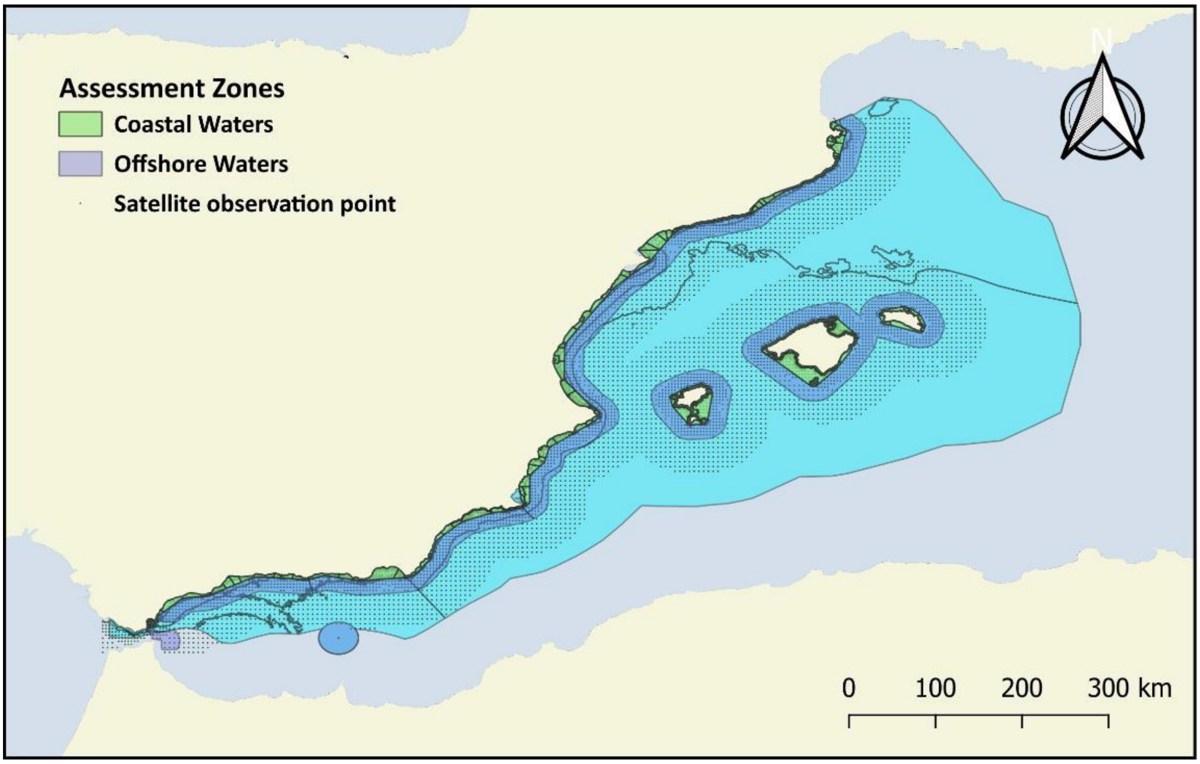

Figure 3.1.3.4.2.c. The Spanish assessment zones in the Alboran Sea and the Levantine - Balearic Sea Subdivision: The dots in the assessment zones represent data in the grid (1 x 1 km) near the coast and in the open waters (4 x 4 km).

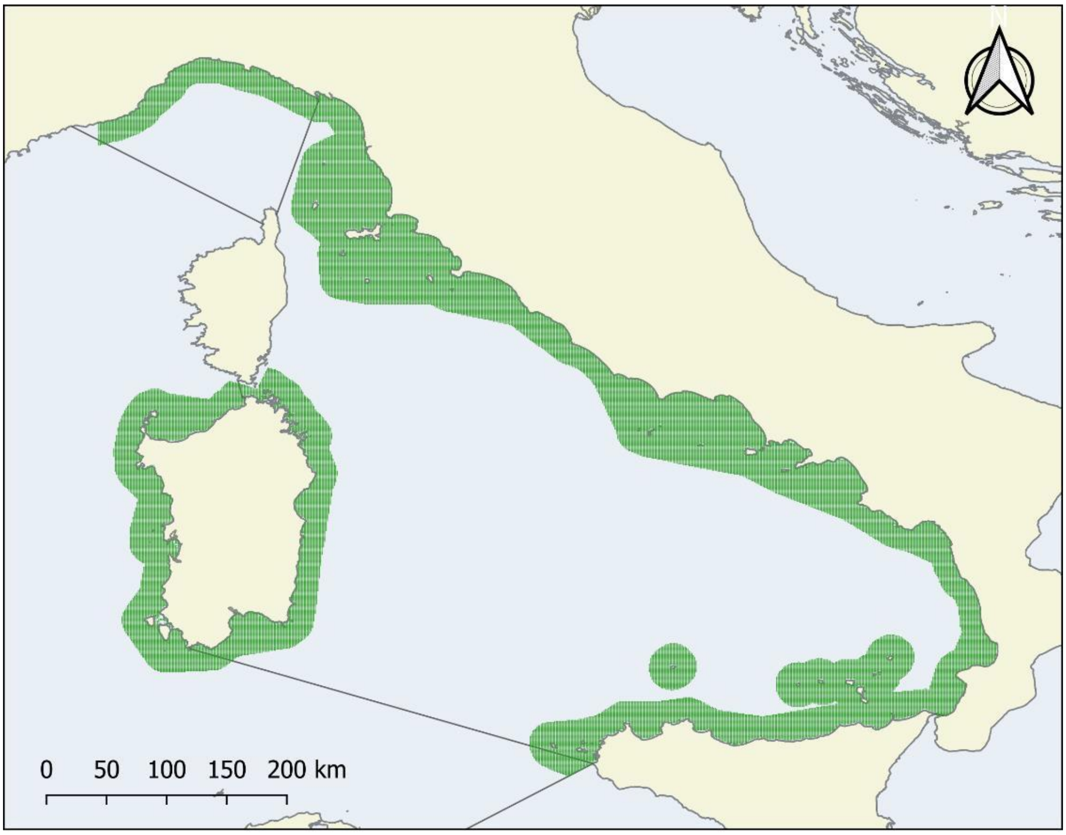

Figure 3.1.3.4.2.d. The Tyrrhenian Sea Sub-division and Italian part of the Central Western Mediterranean Sea Sub-division: The dots in the assessment zones represent data in the grid 1 x 1 km.

Setting the areas of assessment.

366. The two zones of assessment were defined in the Western Mediterranean Sea Sub-divisions for the purposes of the present work: i) the coastal zone and ii) the offshore zone by applying the same approach as applied to the AEL and the CEN Sub-regions.

367. The principle of the NEAT IMAP GES assessment methodology was also followed for setting of the coastal (CW) and the offshore monitoring zones (OW) in the Western Mediterranean Sea Sub-divisions. The CW included internal waters and one Nautical Mile outward. The offshore waters start at the outward border of CW and extend to 20 km outward given there is no eutrophication issues further in offshore70, but also due to correspondence of this coverage to the area where national monitoring programmes are performed (as shown in Figure 3.1.3.4.1.). In addition, the IMAP Spatial Assessment Units (SAUs) were set in the waters of Spain by taking account of the specific circulation pattern in the Spanish waters which influences the biogeochemical processes in the area.

368. The GIS layers for the Assessment Areas were provided by France and Spain, as well as from other relevant sources (International Hydrographic Organization – IHO Seas subdivisions, European Environment Information and Observation Network – EIONET (WFD delimitation (2018)); VLIZ marine subregions).

369. The French Offshore Waters (OW) were divided in the FRD_E (East of Rhone waters) and the FRD_W (West of Rhone waters) as shown in Figure 3.1.3.4.3.a - upper map. For the French Coastal Waters (CW), the division to water bodies (WB) set for implementation of the EU WFD was also used for setting IMAP SAUs and subSAUs. Consequently, the WFDs coding was used for present work (Figure 3.1.3.4.3.a - lower map). The finest IMAP subSAUs set in the French part of the CWMS for the purpose of the present CI 14 assessment are nested in the two main assessment zones i.e., CW and OW of the French part of the CWMS (Figure 3.1.3.4.3.a)

[70] See Lefebvre and Devreker 2020

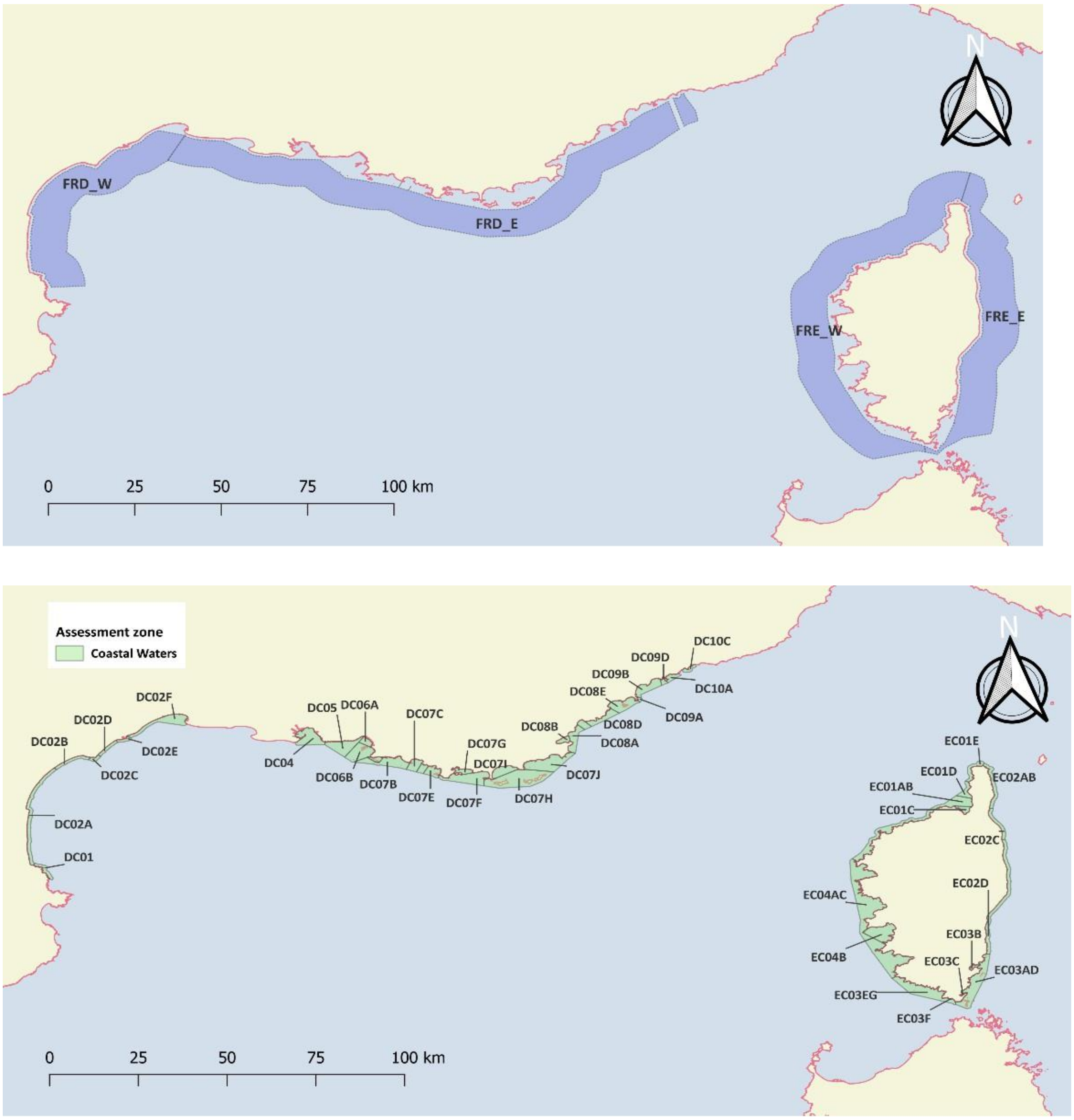

Figure 3.1.3.4.3.a. The nesting of the finest IMAP subSAUs set for the French OW assessment zone (upper map); and depiction of the finest IMAP subSAUs set in CW assessment zone (lower map). For setting IMAP subSAUs along the coast of France, the WFD water bodies were considered.

370. The IMAP Spatial Assessment Units (SAUs) were set in the waters of Spain by taking account of the specific circulation pattern in the Alboran Sea which influences the biogeochemical processes in the area, as shown in Figure 3.1.3.4.3.b1. (Sánchez-Garrido and Nadal, 2022[71]).

[71] Sanchez-Garrido JC and Nadal I (2022) The Alboran Sea circulation and its biological response: A review. Front. Mar. Sci. 9:933390. doi: 10.3389/fmars.2022.933390

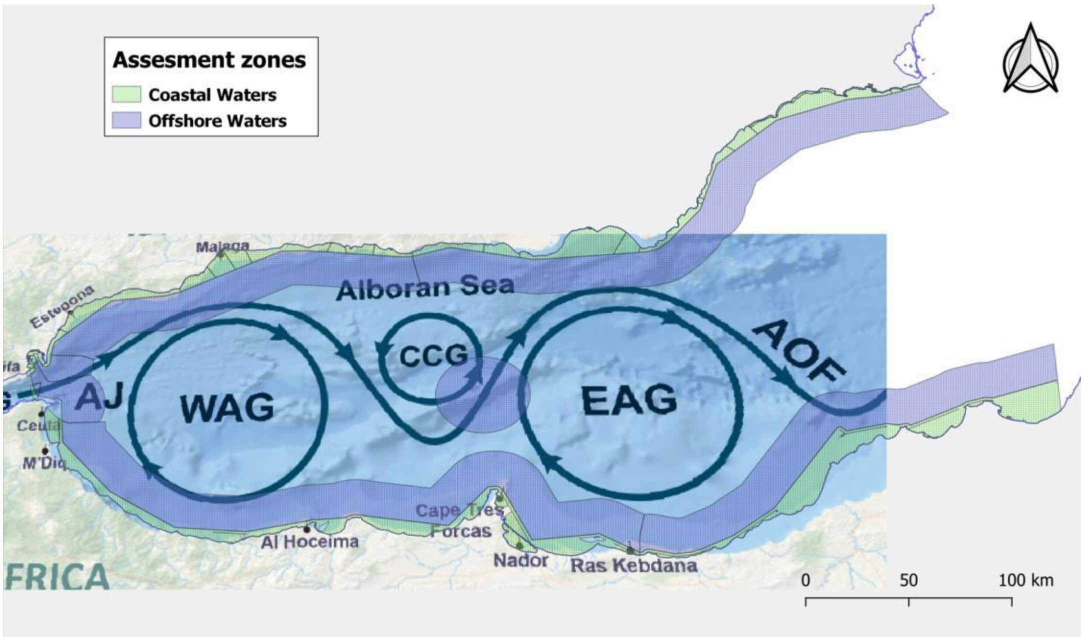

Figure 3.1.3.4.3.b1. A circulation scheme superimposed on the CW and OW assessment zones in the Alboran Sea Sub-division (Sánchez-Garrido and Nadal, 2022)

371. The Spanish OWs were divided in the ESPE (East of Motril) and the ESPW (West of Motril) in the ALB Subdivision, and ESPL (mainland) and ESPI (islands) of the LEV-BAL Subdivision, as shown in Figure 3.1.3.4.3. b2**.**. For the Spanish CW, the division to water bodies (WB) set for implementation of the WFD was also used for setting IMAP SAUs by considering an input submitted by the national authorities. Consequently, the WFDs coding was used for present work Figure 3.1.3.4.3.b3). The MSFD Assessment Water Units of Spain were considered as well as proposed by the national authorities (Figure 3.1.3.4.3.b4).

372. The finest IMAP SAUs set in the ALB and LEV-BAL Sub-divisions for the purpose of the present CI 14 assessment are nested in the CW of the ALB and LEV-BAL Subdivisions (Figure 3.1.3.4.3.b3).

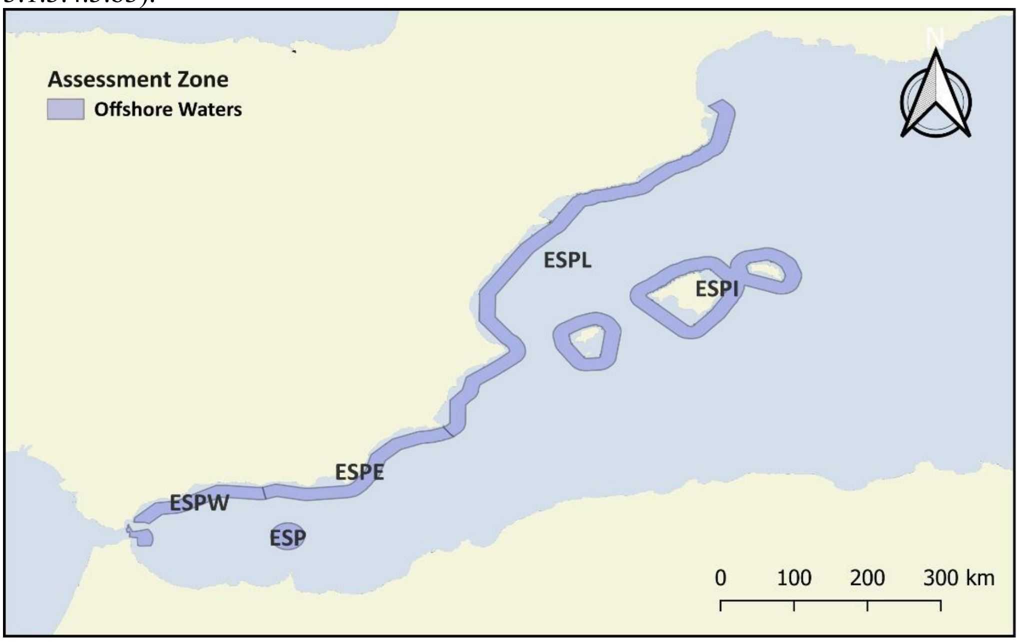

Figure 3.1.3.4.3. b2. The nesting of the finest IMAP SAUs, as set for the ALB and LEV-BAL subdivisions in the OW assessment zone.

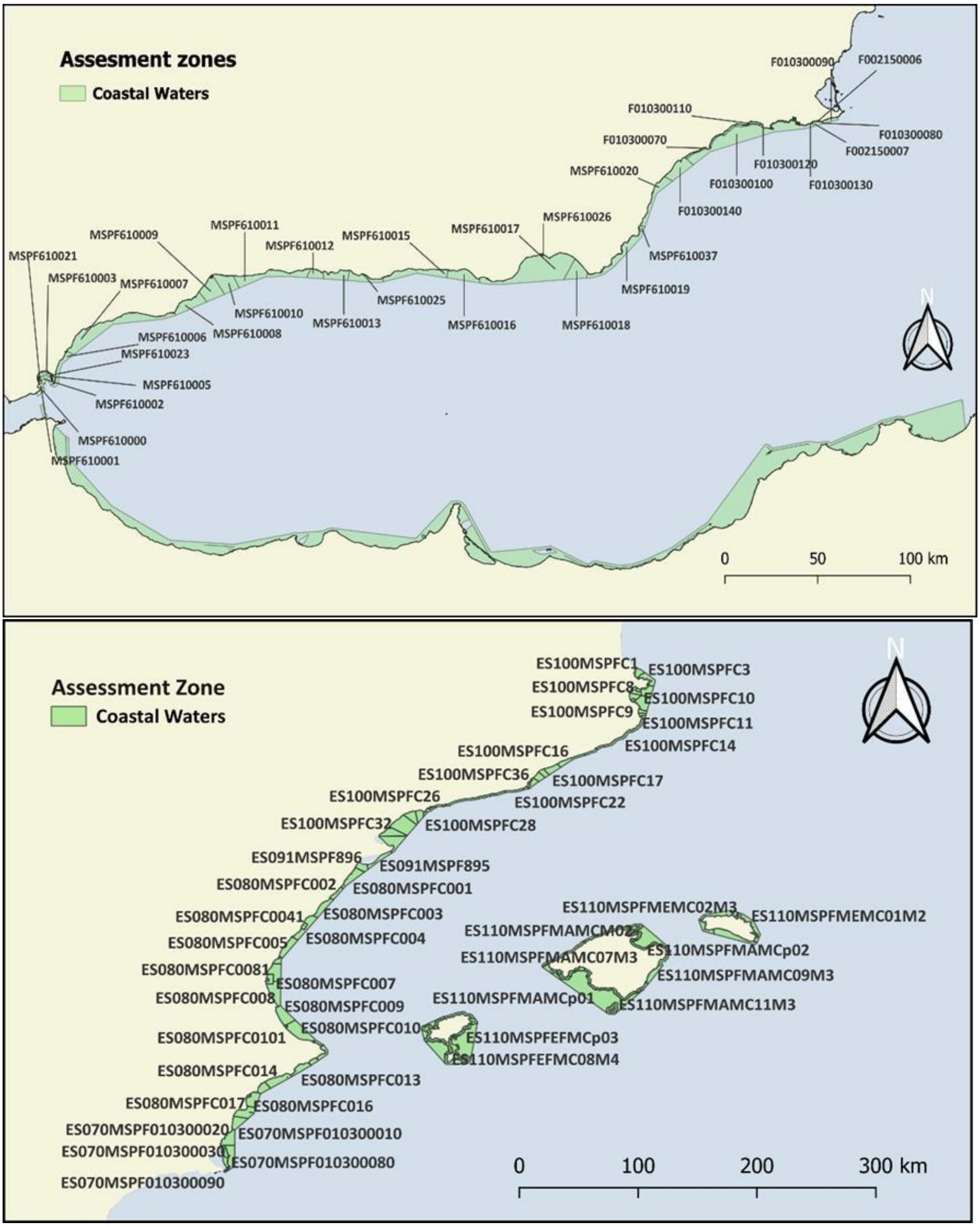

Figure 3.1.3.4.3.b3. The nesting of the finest IMAP SAUs set for the ALB Sub-division (upper map) and for the LEV-BAL Sub-division (lower map), in CW assessment zone. For setting IMAP SAUs along the coast of Spain, the WFD water bodies were considered in order to determine dominating assessment water typology for setting the assessment criteria.

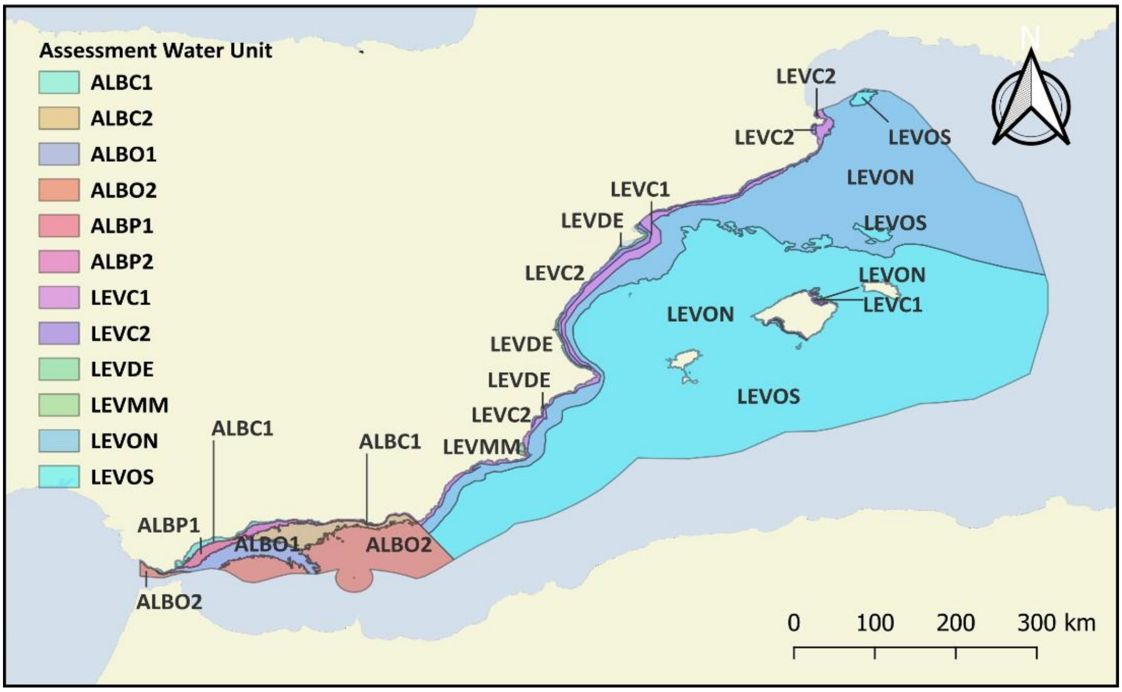

Figure 3.1.3.4.3.b4. The MSFD Assessment Water Units of Spain.

373. The Moroccan Coastal (CW) and Offshore Waters (OW) were divided in the 4 SAUs i.e., the CW and OW MAR_W (West of the Cape of the Three Forks) and the CW and OW MAR_E (East of the Cape of the Three Forks). The Western part of the Moroccan CW and OW mainly encompasses the Western Alboran Gyre (Sánchez-Garrido and Nadal, 2022)[72]. For the Algerian CW and OW, division in the SAUs follows the delimitation of the coastal river basins. For each AZ, the following nine SAUs were obtained: ORAN_W, ORAN_C; ORAN_E, DAHRA, ALGIERS; ALGIERS_E, CONSTANTINE_W, CONSTANTINE_C and CONSTANTIE_E. The Tunisian CW and OW in the WMS were divided in the four SAUs i.e., the CW and OW TUN_WMS_W (west of Cap Blanc) and the CW and OW TUN_WMS_E (east of Cap Blanc). The eastern SAUs are influenced by the Bizerte Lagoon and the Gulf of Tunis.

374. The IMAP SAUs set in the Southern part of the WMS for the purpose of the present CI 14 assessment are nested in the two main assessment zones i.e. CW and OW of the Southern part of the CWMS Sub-division (Figure 3.1.3.4.3.c).

[72] Sanchez-Garrido, J.C., Nadal, I. (2022) The Alboran Sea circulation and its biological response: A review. Front. Mar. Sci. 9:933390. doi: 10.3389/fmars.2022.933390

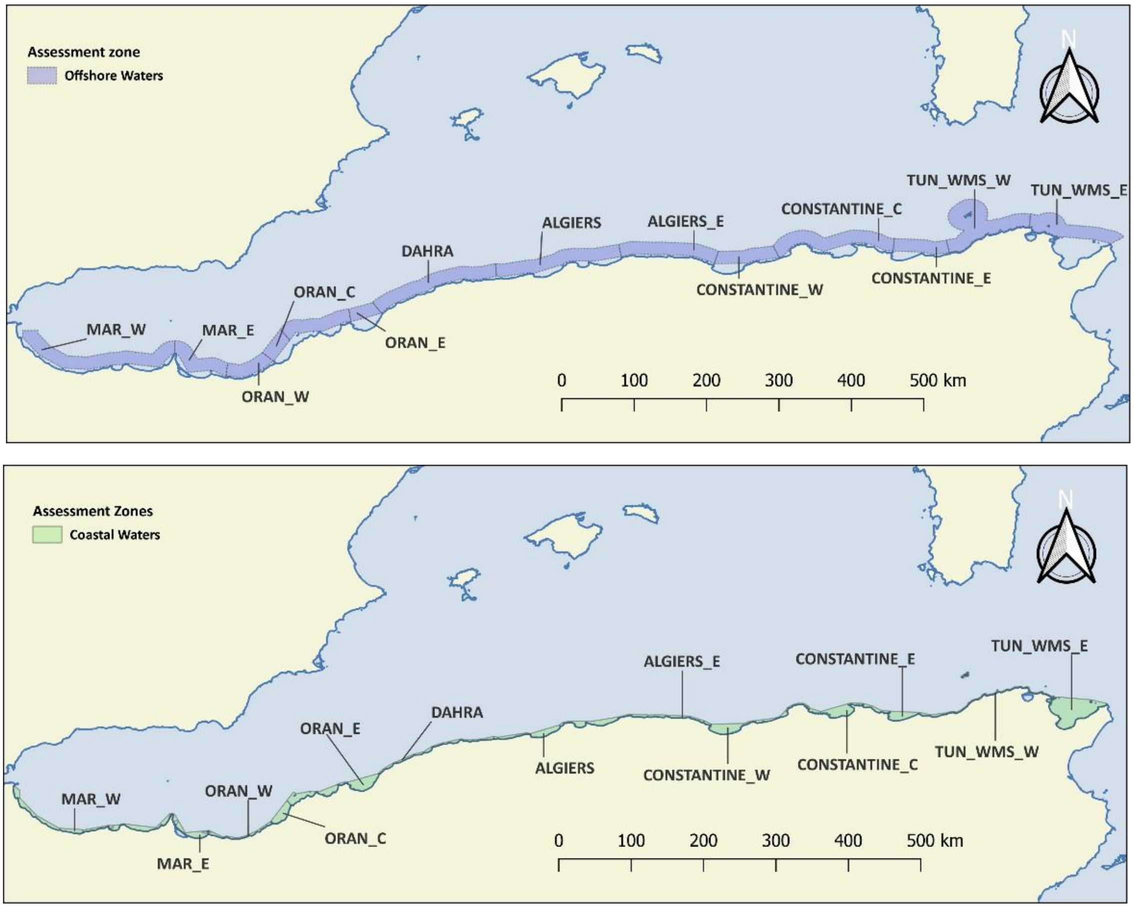

Figure 3.1.3.4.3.c. The nesting of the IMAP SAUs set for the OW assessment zone (upper map) in the Southern part of the CWMS Sub-division; and depiction of the IMAP SAUs set in CW assessment zone (lower map).

375. The Italian Coastal (CW) and Offshore (OW) waters were divided in eight assessment units (SAUs) located North of Civitavecchia (IT_TYR_N), out of the main Tyrrhenian circulation patterns); and South of Civitavecchia (IT_TYR_S), as shown in Figure 11 (upper map). For the Sardinia Island, the assessment units are IT_ISL_W (West coast) and IT_ISL_E (East coast). To obtain the codes of eight SAUs, the prefix AZ was added resulting in the following coding of the SAUs: CW_IT_TYR_N, OW_IT_TYR_N, etc.

376. Figure 3.1.3.4.3.d. depicts the finest IMAP subSAUs nesting in the two main assessment zones i.e., CW and OW.

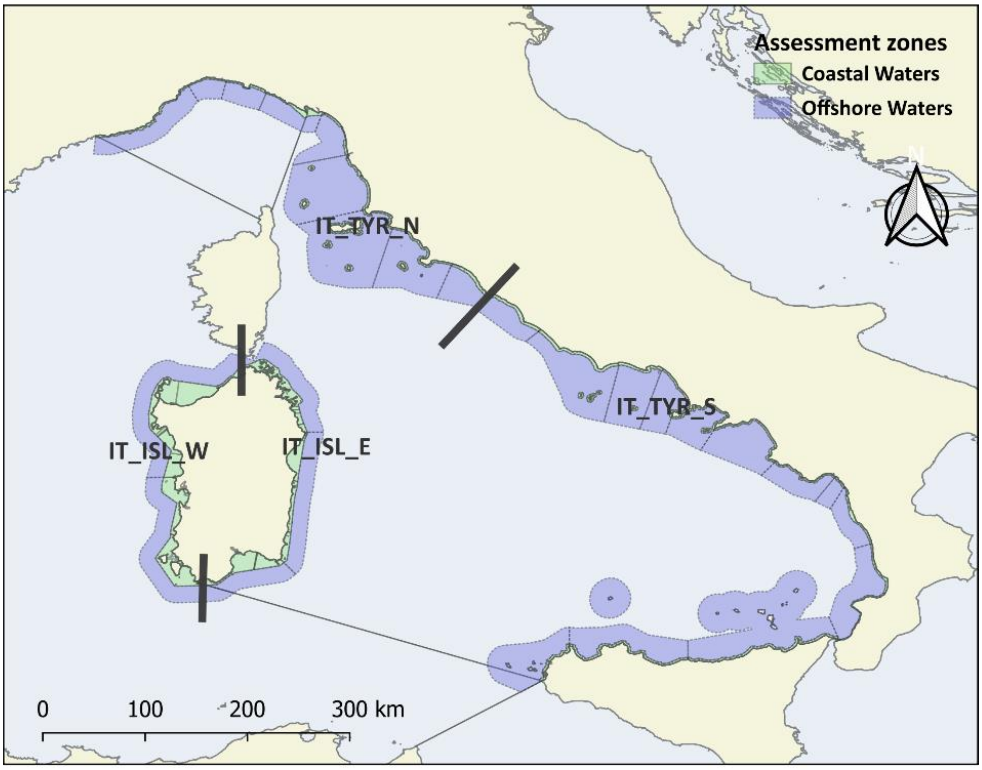

Figure 3.1.3.4.3.d. The nesting of the IMAP SAUs set for OW and CW in the Tyrrhenian and Italian part of the CWMS Sub-division (upper map); and depiction of the finest IMAP subSAUs (lower map).

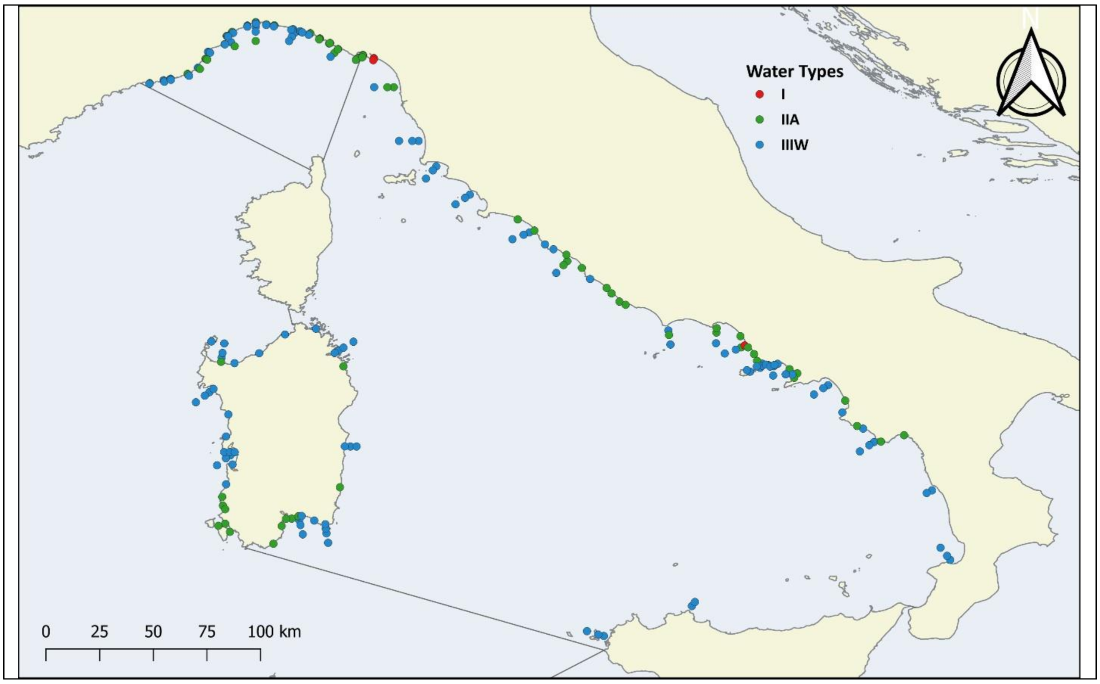

Figure 3.1.3.4.3.d: The water types along the Tyrrhenian Sea Sub-division and part of the CWMS:

The Waters of Italy.

Setting the good/non good boundary value/threshold for the Simplified G/M comparison assessment methodology application in the WMS Sub-region

377. Given the use of reference and boundary water types related values, as set by the Decision IG.23/6 of COP 20 (MED QSR), was impossible for the present work in the Western Mediterranean Sea Sub-region, the calculation of the assessment criteria applicable within the present work was undertaken, along with the normalized transformation (as elaborated above for the AEL Sub-region and for the CEN). Namely, the use of a new parameter for assessment i.e., the satellite derived Chl a imposes calculation of a new set of assessment criteria if there is no tested relationship of the satellite derived Chl a data with in situ measured Chl a data based on effects-pressures relationship. Namely, the use of reference and boundary water types related values, as set by the Decision IG.23/6 of COP 20 (MED QSR), was impossible for the present work based on the use of the satellite-derived data.

378. As explained above, setting the threshold to 50 % implies that low levels of disturbance (defined as less than +50 % deviation) resulting from human activity are considered acceptable, while moderate (i.e., greater than +50 %) deviations are not considered acceptable for the water body in question. A further modification to this rule was applied within the present work in the Western Mediterranean Sea Sub-region given the 50th percentile represents the mean value of the distribution, and the 85th percentile ~ mean +1 SD represents the G/M threshold.

379. For the French part of the CWMS, an additional modification to the above rule was applied further to the recent expert-based analysis of the satellite derived products for Chla, realised at the local scale of coastal water masses[73], over the period 2016-2021. It indicates that most coastal waters are in either good or very good status regarding Chl *a* concentrations. Although waters above the G/M threshold (oN85), set for satellite derived chl *a* data, should be classified as non-good, in the present

[73] Technical justification provided by France

case they were classified as good if the calculated values were very close to the G/M threshold (oN85) by taking account of the water masses features. In addition, the status assigned by applying the criteria as provided in Table 3.1.3.4.2 was adjusted further to the justification provided by France in relation to the national assessments derived by applying the G/nonG back transformed threshold based on *in situ* measurements i.e., the national assessment criteria which correspond to 90^{th} percentile transformed to G/M, as also provided by UNEP/MAP Decision 22/7.

380. The transformation of percentile to z-scores were obtained using the pnorm() an qnorm() functions in R. The RC values (oN10) and the G/M thresholds (oN85) were calculated from the normalized values through the predict function. The assessment criteria calculation as presented in Tables 4.2.4.2; 4.2.4.3, 4.2.4.4. and 4.2.4.5.a. show the results obtained by the Assessment zones and SAUs.

381. To obtain the assessment criteria for the subSAUs in Spanish waters, they are paired with the assessment water types (AWT), considering that the predominant AWT in the subSAU determined the selection of the assessment criteria. The codes assigned to AWTs are the same as the codes of the MSFD AWUs. At the SAU level, many AWTs coexist, and therefore, different strategies must be considered; for example, one strategy can be to consider that if no more than 10% of subSAUs, normalized by their surface are in non-good status, then the SAU related to these subSAUs is considered in non-good status.

382. As it is elaborated above, there is a difference between the thresholds calculated from the satellite-derived data used for the present assessment and the assessment criteria calculated from in situ measurements, i.e., both national thresholds of Spain which are in compliance with the Marine Strategy Framework Directive (2008/56/EC) and Water Framework Directive (2000/60/EC), and the assessment criteria as adopted by IMAP Decision 22/7. Given this difference, the regional assessment findings do not fully match the eutrophication evaluation performed by Spain by applying the assessment criteria calculated from in situ measurements[74].

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[74] https://www.miteco.gob.es/es/costas/temas/proteccion-medio-marino/estrategias-marinas/

Table 3.1.3.4.2: Reference conditions (oN10) and G/M threshold (oN85) set by IMAP spatial assessment units in the French part of the CWMS Sub-division. Dominant water type out of all Water Types (WT) assigned to different sub-SAUs within related SAUs are also presented. Table shows the Coastal water masses typology (WT) and corresponding G/M threshold (oN85), based on the use of satellite-derived Chl *a* data, as well as back transformed G/M threshold based on *in situ* measurements i.e., the national assessment criteria which correspond to 90th percentile transformed to G/M, as also provided in UNEP/MAP Decision 22/7.

AZ	SAU	WT	oN50	oN50+50	oN90	oN10	oN85	oN25	good/non-good	
									P90	GM
		I							10	4,12
CW	FRD_E	IIIW	0,258	0,388	0,562	0,193	0,415	0,22	1,89	0,78
CW	FRD_W	IIA	1,039	1,558	1,544	0,612	1,409	0,772	3,5	1,44
CW	FRE_E	III Isl.	0,212	0,318	0,414	0,161	0,327	0,185	1,22	0,50
CW	FRE_W	III Isl.	0,168	0,253	0,251	0,133	0,222	0,147	1,22	0,50
OW	FRD_E	IIIW	0,228	0,343	0,676	0,189	0,589	0,207	1,89	0,78
OW	FRD_W	IIA	0,447	0,67	0,757	0,321	0,674	0,372	3,5	1,44
OW	FRE_E	III Isl.	0,16	0,24	0,187	0,144	0,179	0,15	1,22	0,50
OW	FRE_W	III Isl.	0,158	0,237	0,186	0,14	0,181	0,148	1,22	0,50

oN50 – Mean, oN50+50 – Mean + 50%, oN90 – 90th percentile, oN10 – 10th percentile, oN85 – 85th percentile i.e. G/M threshold based on use of satellite-derived data, oN25 – 25th percentile; P90 – G/M threshold from 90th percentile of *in situ* measurements ; GM - G/M threshold set as GM back transformed from 90th percentile of *in situ* measurements.

Table 3.1.3.4.3. Reference conditions (oN10) and G/M threshold (oN85) calculated from satellite-derived Chl *a* data and set by Spanish Water Types. The codes assigned to the assessment water types (AWT) are the same as the codes of the MSFD AWUs. oN85 represents G/M boundary threshold calculated from the satellite-derived Chl *a* data (shared by Spain). P90 represents 90th percentile back transformed from oN85. FP90 represents G/M threshold calculated from the satellite-derived Chl *a* data (as shared by Spain) by using 90th percentile annual values and applying the same calculation method as for calculation of oN85. ESP represents national G/M threshold values of Spain, expressed as 90th percentile, and calculated from *in situ* measurements (national reports for ALB and LEV-BAL as shared by Spain). There are no significant differences between thresholds calculated from satellite-derived data and thresholds calculated from *in situ* measured data, although they cannot be identical.

AWT	oN50	oN50+50	oN90	oN10	oN85	oN25	P90	FP90	ESP
ALBC1	0,702	1,052	0,957	0,544	0,915	0,617	2,218	2,403	2,47
ALBC2	0,297	0,445	0,407	0,241	0,378	0,258	0,916	0,942	1,65
ALBO1	0,332	0,498	0,390	0,261	0,379	0,288	0,919	0,579	1,99
ALBO2	0,225	0,338	0,293	0,177	0,276	0,198	0,669	0,539	0,68
ALBP1	0,465	0,698	0,612	0,377	0,569	0,419	1,379	1,186	2,89
ALBP2	0,448	0,673	0,611	0,327	0,571	0,376	1,384	1,542	2,03
LEVC1	0,269	0,404	0,374	0,192	0,347	0,226	0,841	0,714	1,80
LEVC2	0,498	0,746	0,711	0,375	0,658	0,420	1,595	0,976	2,00
LEVDE	0,823	1,234	0,949	0,741	0,944	0,769	2,289	1,236	2,30
LEVON	0,179	0,269	0,230	0,139	0,218	0,157	0,529	0,435	0,60
LEVOS	0,123	0,184	0,158	0,103	0,150	0,110	0,364	0,312	0,26

oN50 – Mean, oN50+50 – Mean + 50%, oN90 – 90th percentile, oN10 – 10th percentile, oN85 – 85th percentile, oN25 – 25th percentile, P90 – 90th perc. back transformed from oN85, FP90 – 90th perc. calculated from mean annual values of the 90th perc., ESP – 90th perc. represents G/M threshold values calculated from in situ measurements for the Spanish waters

Table 3.1.3.4.4.: Reference conditions (oN10) and G/M threshold (oN85) set by IMAP spatial assessment units in the Southern part of the CWMS.

Country	AZ	oN50	oN50+50	oN90	oN10	oN85	oN25
MAR	CW	6017	0,449	0,674	0,713	0,277	0,637
MAR	OW	22360	0,294	0,441	0,389	0,227	0,363
DZA	CW	20982	0,319	0,478	0,74	0,205	0,592
DZA	OW	73665	0,21	0,316	0,283	0,167	0,267
TUN	CW	8787	0,229	0,344	0,577	0,162	0,477
TUN	OW	25350	0,162	0,243	0,208	0,132	0,193

oN50 – Mean, oN50+50 – Mean + 50%, oN90 – 90th percentile, oN10 – 10th percentile, oN85 – 85th percentile i.e., G/M threshold based on use of satellite-derived Chl *a* data, oN25 – 25th percentile

Table 3.1.3.4.5.a.: Reference conditions (oN10) and G/M threshold (oN85) set by IMAP SAUs in the Italian waters in the Tyrrhenian Sea and the part of CWMS.

AZ	SAU	oN50	oN50+50	oN90	oN10	oN85	oN25
CW	CW_ITA_ISL_E	0,095	0,142	0,213	0,067	0,151	0,074
CW	CW_ITA_ISL_W	0,104	0,156	0,225	0,079	0,169	0,087
CW	CW_ITA_TYR_N	0,348	0,522	1,074	0,085	0,882	0,117
CW	CW_ITA_TYR_S	0,263	0,395	1,389	0,085	1,124	0,121
OW	OW_ITA_ISL_E	0,074	0,112	0,099	0,059	0,095	0,063
OW	OW_ITA_ISL_W	0,083	0,124	0,102	0,068	0,098	0,075
OW	OW_ITA_TYR_N	0,095	0,143	0,209	0,079	0,156	0,084
OW	OW_ITA_TYR_S	0,077	0,116	0,146	0,061	0,111	0,067

oN50 – Mean, oN50+50 – Mean + 50%, oN90 – 90th percentile, oN10 – 10th percentile, oN85 – 85th percentile i.e., G/M threshold based on use of satellite-derived Chl *a* data, oN25 – 25th percentile

383. As explained above, the compatibility of the present classification was achieved with a five classes GES/non GES scale set in the Adriatic Sea Sub-region.

An application of the EQR Methodology in the Tyrrhenian Sea Sub-division and part of the CWMS: the Waters of Italy

384. The EQR assessment methodology was applied on in situ Chl a data reported by Italy to IMAP IS. However, in situ data available for nutrients were not evaluated given the lack of assessment criteria developed for nutrients in the Tyrrhenian Sea. The application of the EQR methodology was also based on typology related assessments. The water type was determined as a five-year arithmetic mean of salinity and compared to the ranges as shown in Table 3.1.3.4.5.b. The water types distribution in the Tyrrhenian Sea is presented in Figure 3.1.3.4.3.d.

385. The likely GES or likely non GES classes are assigned to the assessment units for the assessment of the Tyrrhenian Sea Sub-division and part of the CWMS by applying the EQR assessment methodology. Namely, an application of this methodology allows the use of the reference conditions and boundaries for the five ecological quality classes and therefore supports the assessment undertaken to be considered as the assessment of good environmental status. Although only one parameter was assessed the assessment is considered likely GES/non-GES given the finest discrimination of the assessment classes is possible by application of the EQR. As explained above, for the application of the simplified G/M comparison, the two status classes i.e. good and non-good expressed as good and moderate status (i.e. G/M) are assigned to the units assessed regarding Chl *a*, as only one parameter assessed.

Table 3.1.3.4.5.b: Major coastal water types with density and salinity boundary

	Type I	Type IIA Tyrrhenian	Type IIIW
σ_t (density)	<25	25<d<27	>27
S (salinity)	<34.5	34.5<S<37.5	>37.5

386. The actual and normalized EQRs for all boundaries of Water Types I and II A in the Tyrrhenian Sea are shown in Tables 3.1.3.4.5.c and d, respectively.

Table 3.1.3.4.5.c: Reference conditions and boundaries of ecological quality classes expressed by different parameters for Water Type I in coastal and open waters of the Tyrrhenian Sea. Normalized EQRs were used for ecological quality assessment.

Boundaries	**TRIX**	$c(\mathbf{Chl}\boldsymbol{a}_{\mathbf{aGM}})/\mathbf{\mu g\ L^{-1}}$	**Chla$_{aGM}$**	
			EQR$_{actual}$	**EQR$_{normalized}$**
RC		1.40	1.00	1.00
H/G	4.25	2.0	0.70	0.85
G/M	**5.25**	**5.0**	**0.28**	**0.62**
M/P	6.25	12.6	0.11	0.38
P/B	7	25.0	0.06	0.20

Table 3.1.3.4.5.d: Reference conditions and boundaries of ecological quality classes expressed by different parameters for Water Type IIA in coastal and open waters of the Tyrrhenian Sea. Normalized EQRs were used for ecological quality assessment.

Boundaries	**TRIX**	$c(\mathbf{Chl}\boldsymbol{a}_{\mathbf{aGM}})/\mathbf{\mu g\ L^{-1}}$	**Chla$_{aGM}$**	
			EQR$_{actual}$	**EQR$_{normalized}$**
RC		0.32	1.00	1.00
H/G	4	0.48	0.66	0.84
G/M	**5**	**1.2**	**0.27**	**0.62**
M/P	6	2.9	0.11	0.40
P/B	7	7.3	0.04	0.18

387. By applying the above shown assessment criteria, the assessed subSAU were classified in GES/non GES status, comparing the EQRnormalized to the G/M boundary of 0.62 set as the good/non good status boundary limit.

388. Contrarily to the five ecological classes approach adopted for Water Types I and II A in the Tyrrhenian Sea, a single threshold approach is used for Water Type III W. The GES/non GES threshold value applied was 0.48 µg/L representing an annual GM value of H/G boundary for Water Types II A.

Results of the Simplified G/M comparison assessment methodology application in the WMS Sub-region

389. As for the AEL and the CEN, the two status classes i.e. good and non-good are assigned to the units assessed in the WMS by applying the simplified G/M assessment methodology since the assessment findings are based on the use of only one parameter and therefore, the integrated consideration of the minimum of parameters needed to assess the good environmental status for IMAP CIs 13 and 14 i.e. the GES was impossible.

390. Upon setting the reference conditions and the G/M threshold, each observation point, or area were classified in good and non-good status , by comparing the value of the indicator i.e., the satellite derived Chla to the G/M threshold, i.e. the back transformed 85th percentile of normalized distribution.

391. In addition, to decide on good/non-good status in the French waters, the local scientific expertise regarding ecosystem functioning, water masses characteristics (hydrology, water renewal, confinement of the water mass) and satellite-derived product analyses were taken into account as provided by France.