Table 3.1.4.1.3.a. Number of data points and their percentage from the total number of data points in each category based on the CHASE+ tool, calculated using the new AEL_BACs..

CHASE+		**Blue High**	**Green Good**	**Yellow Moderate**	**Brown Poor**	**Red Bad**
		NPA or GES		**PA or non-GES**		
Sediment	Total number of data points					
		CS=0.0-0.5	**CS =0.5-1.0**	**CS =1.0-2**	**CS =2-5**	**CS >5**
Cd, Hg, Pb	94*	23	40	18	11	2
% from total number of data points		*24*	*43*	*19*	*12*	*2*
		CR=0.0-0.5	**CR=0.5-1.0**	**CR =1.0-2**	**CR =2-5**	**CR>5**
Σ_{16} PAHs	21	3	6	3	4	5
% from total number of data points		*14*	*29*	*14*	*19*	*24*
Σ_5 PAHs	53	19	9	7	10	8
% from total number of data points		*36*	*17*	*13*	*19*	*5*
Σ_7 PCBs	31	17	5	3	3	3
% from total number of data points		*55*	*16*	*10*	*10*	*10*

*32 stations reported all the 3 TMs, 34 only Cd and Pb and 28 only Pb.

Assessment of Trace metals in sediments of the AEGS.

421. The 16 stations classified as non-GES (out of the 31) were distributed in the northern and central part of the AEGS. Most stations were located in bays (Table 3.1.4.1.1.a; Figure AEGS 3.1.4.1.1.C), where usually the water exchange is slower than in open waters, promoting accumulation of land-based source contaminants. The 67 stations classified in GES (high and good status) were distributed along the whole AEGS sub-division (Figure AEGS 3.1.4.1.1.C).

422. Only for 32 stations data were reported for all the 3 TMs. For 34 stations data were reported only for Cd and Pb and for 28 stations only for Pb. A detailed examination of the CRs for the individual metals, found that mainly Pb and to a lesser degree Cd, contributed to the classification of 2 out of 94 stations, as in bad status. One was located in the inner Saronikos Gulf (CW36) and one in the Northern Aegean (CW54) (Figure AEGS 3.1.4.1.1.C). Eleven stations were classified as in poor status: 8 in the Elfsis Bay and inner Saronikos Gulf, due to elevated Pb concentrations, one (CW32) in the Elfsis Bay due to Pb and to a lesser degree Cd. Two stations, i.e. ALISW2, CABSSW1, in the vicinity of Aliaga and Yenisakran, were classified as poor mainly due to elevated Hg concentrations. Using CS, 18 stations were classified as moderate and they were distributed across the AEGS. No specific, demarcated area could be classified as non-GES based on these 18 stations. The 63 remaining stations were classified in the high and good statuses (in-GES). Six stations for which data were reported by Türkiye, defined as reference stations, were in the high status (2 stations) and in the good status of classification (4 stations).

423. Fifteen out of the 31 stations classified as non-GES were located in the Elfsis Bay and inner Saronikos Gulf, known to be impacted by anthropogenic activities . This area is the seaward boundary of the metropolitan areas of Athens and Piraeus port, hosting 1/3 of the current Greek population (3.2 million people; Census 2011). More than 40% of the Greek industries are located in the coastal area of the Elefsis Bay, including some of the biggest plants of the country, such as oil refineries, steel and cement industries, and shipyards (Karageorgis et al., 2020 and references therein). Increased concentrations of trace elements in this area, resulting from the discharges of domestic and industrial effluent, have been documented since the late 1970s. The major sources of pollution were identified as the Psyttaleia wastewater treatment plant, a fertilizer plant- operating in the Inner Saronikos Gulf until 1999, steel mills and shipyards in the Elefsis Bay. The contamination found in the bay has resulted in the accumulation of metals in mussel tissues, which followed a spatial gradient related to land-based sources. Karageorgis et al. 2020 found maximal Pb concentrations (in conjunction with Cu, Zn and As) in the Elefsis Bay and the Psyttaleia Island region, with N-S decreasing trends. Minor Pb enrichment was recorded at the deeper sector of the Outer Saronikos Gulf. A temporal (1999–2018) decrease in metal concentrations was found for 2 out of the 14 stations sampled in the Elefsis Bay. Several polluting industries have ceased their operation during the last decade. Therefore, the decreasing trend in the most industrialized part of the study area is connected to the reduction of metal discharges in the coastal environment. Furthermore, environmental policy enforcement combined with technological improvements by big industrial polluters, such as the steel-making industry have contributed to the improvement of sediment quality.

424. The 28 stations reported by Karageorgis et al. (2020 a,b) were located in a very limited area of the Saronikos and Elfesis Gulf, that correspond to about 0.5% of the total AEGS area. Moreover, they reported only the concentrations of Pb in sediments. This emphasis of a small area could introduce a bias in the whole sub-division assessment. Therefore, for comparison, the assessment was performed without taking these stations into consideration. The assessment found that 20% of the stations were in high status, 53% in good status, 20% in moderate status, 4% in poor status and 3% in bad status. In this case, 73% of the stations were classified in-GES, and the status of the AEGS remains marginally non-GES, therefore the exclusion of these stations did not change the overall assessment of the sub-division.

425. The whole AEGS is classified as non-GES (Figure AEGS 3.1.4.1.1.C). In brief, only 67% of the stations were in GES for TM in sediments. Therefore, by applying the decision rule agreed for CHASE + assessment methodology which recommends that only if at least 75% of the elements are in GES, the area should be considered in GES, the whole AEGS is classified as non-GES regarding TM in sediments. However, this is a result of the contribution from only 2 limited affected areas (1) the Elfesis Bay and inner Saronikos Gulf, and 2) the two stations near Aliaga and Yenisakran. When data from these affected areas, that constitute less than 1% of the AEGS, are not taken into account, then 82% of the stations (65 out of 79 stations) are in GES, and the AEGS sub-division can be classified as in GES. These 79 stations are distributed evenly across the AEGS sub-division, providing a good coverage of the sub-division.

Assessment of Σ_{16} PAHs and of Σ_5 PAHs in sediments of the AEGS

426. Σ_{16} PAHs in sediments: There were only 21 stations with data for Σ_{16} PAHs in sediments, and data for all of them were reported by Greece. It can be seen (Table 3.1.4.1.1.; Figure AEGS 3.1.4.1.2.C) that the stations located offshore are in-GES (8 stations, 38% of total stations), while the stations located in enclosed areas, except one, are classified as non-GES (12 stations, 57% of total stations). However, this is based on data from only 21 stations, which is not enough for a confident assessment. Additional data are needed to improve the assessment and to better delimit possible non-GES areas.

427. Σ_5 PAHs in sediments: There were only 21 stations with data for Σ_{16} PAHs in sediments, however Türkiye reported data for Σ_5 PAHs[83] for 32 stations. Although Σ_5 PAHs is not a mandatory parameter, the assessment based on it was performed due to significant more data availability for Σ_5 PAHs compared to Σ_{16} PAHs (53 vs 21 data points, respectively) encompassing a larger area of the AEGS. Therefore, an exception was made in order to increase confidence of the assessment.

428. For the stations with available data for Σ_{16} PAHs, the assessment performed using Σ_5 PAHs was identical to the assessment based on Σ_{16} PAHs (Figure AEGS 3.1.4.1.2.C), except for one station, CW41 that was now classified as in good status instead of in moderate status. Out of the 53 available stations, about half (28 stations, 53% of the total stations) were classified in-GES (high and good statuses) for Σ_5 PAHs in sediments, and about half (25 stations, 47% of the total stations) as not in-GES (moderate, poor and bad statuses) (Figure AEGS 3.1.4.1.3.C).

[83] Σ_4 PAHs was also reported, but it was decided to assess the status based on Σ_5 PAHs given it encompasses all 4 PAHs; Both Σ5 PAHs and Σ4 PAHs are non-mandatory parameters for CI 17, whereby Σ16 PAHs, is a mandatory parameter.

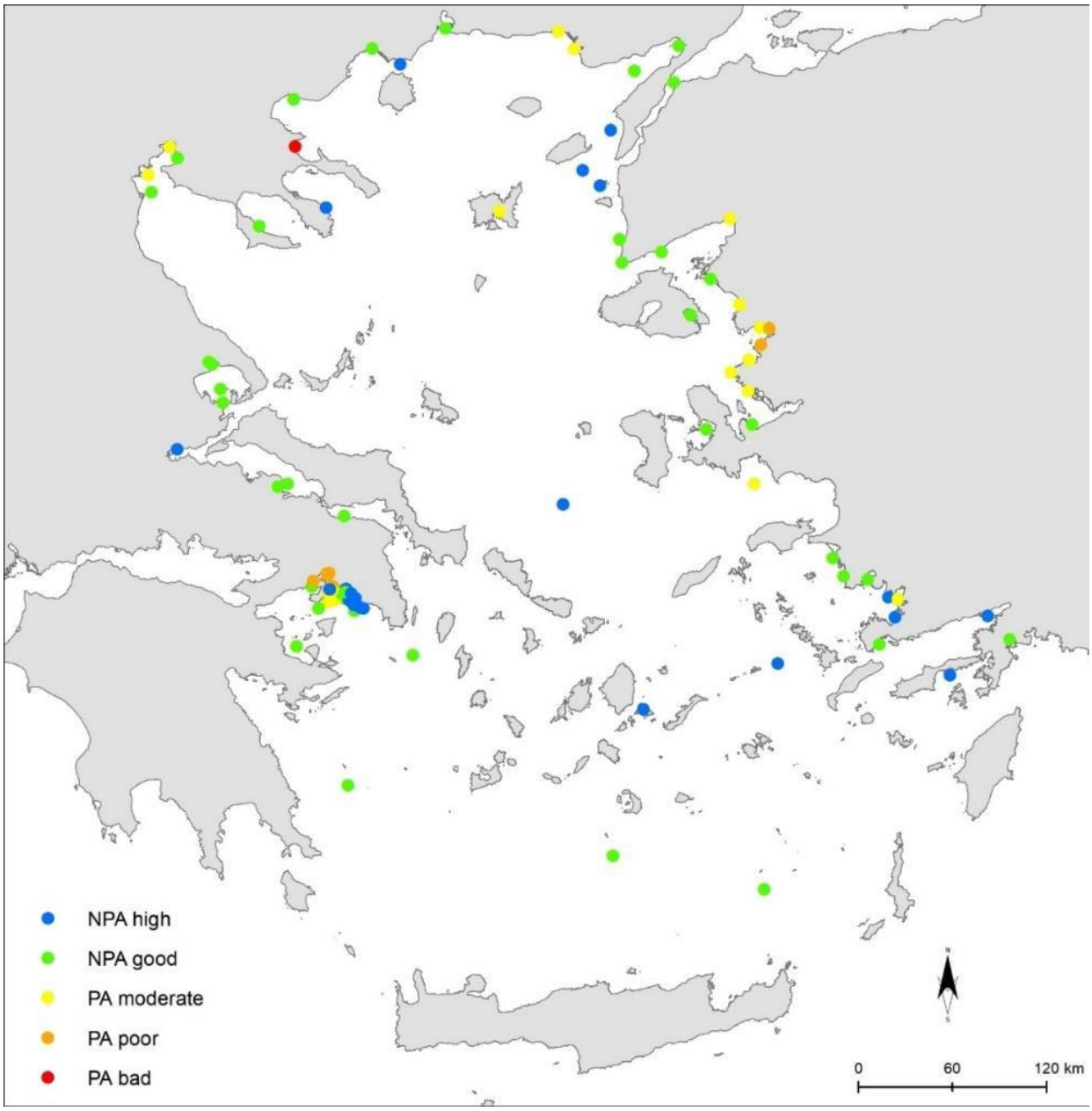

Figure AEGS 3.1.4.1.1.C. Results of the CHASE+ assessment methodology to assess the environmental status of TM in sediments in the AEGS, using AEL_BACs as thresholds. Stations in blue - NPAhigh (CS=0.0-0.5); stations in green- NPAgood (CS =0.5-1.0); Stations in yellow- PAmoderate (CS =1.0-2.0); stations in brown - PApoor (CS =2.0-5.0) and stations in red - PAbad (CS > 5.0). Blue and green stations are considered in GES; yellow, brown and red stations are considered non-GES.

429. Therefore, there are indications that AEGS might be classified as non-GES regarding Σ_5 PAHs in sediments. However, only 2 limited affected areas were identified in non-GES, similarly to the assessment of TM in sediments: 1) the Elfsis Bay and inner Saronikos Gulf and 2) the area encompassing the coast around Kucukkoy, Dikili, Candarli, Aliaga, and Yenisakran. The southern part of the AEGS can be classified as in GES, as all stations, except the two, were in high and good statuses (Figure AEGS 3.1.4.1.3.C).

430. It was not possible to classify the AEGS sub-division regarding data for Σ_{16} PAHs in sediments (Figure AEGS 3.1.4.1.2.C.). There are indications that the offshore zone is in GES while the enclosed areas might be found as non-GES. Additional data are needed to improve the assessment and delimit possible affected areas.

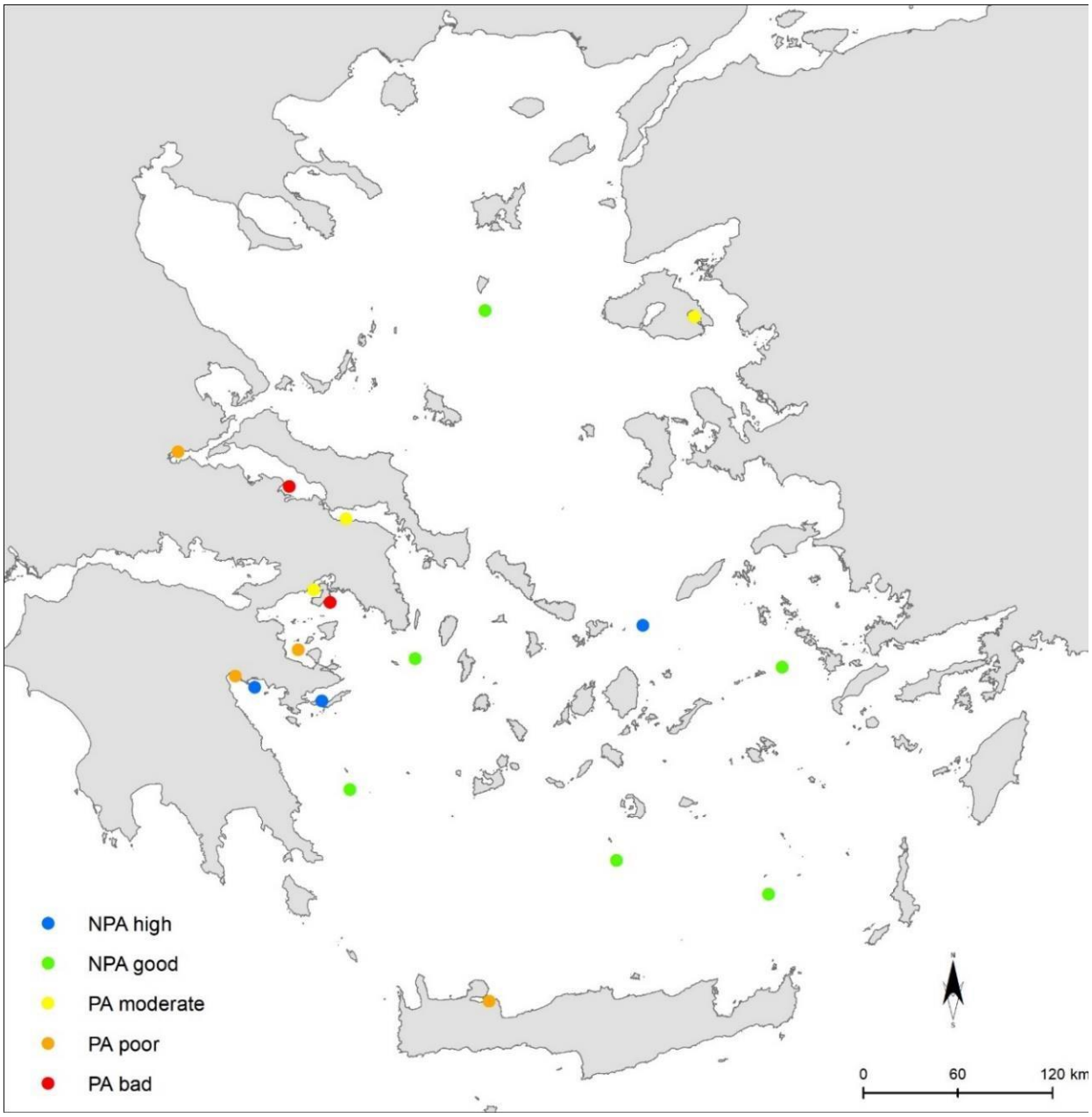

Figure AEGS 3.1.4.1.2.C. Results of the CHASE+ assessment methodology to assess the environmental status of Σ_{16} PAHs in sediments in the AEGS, using AEL_BACs as thresholds. Stations in blue - NPAhigh (CR=0.0-0.5); stations in green- NPAgood (CR =0.5-1.0); Stations in yellow- PAmoderate (CR =1.0-2.0); stations in brown - PApoor (CR =2.0-5.0) and stations in red - PAbad (CR > 5.0). Blue and green stations are considered in GES; yellow, brown and red stations are considered non-GES.

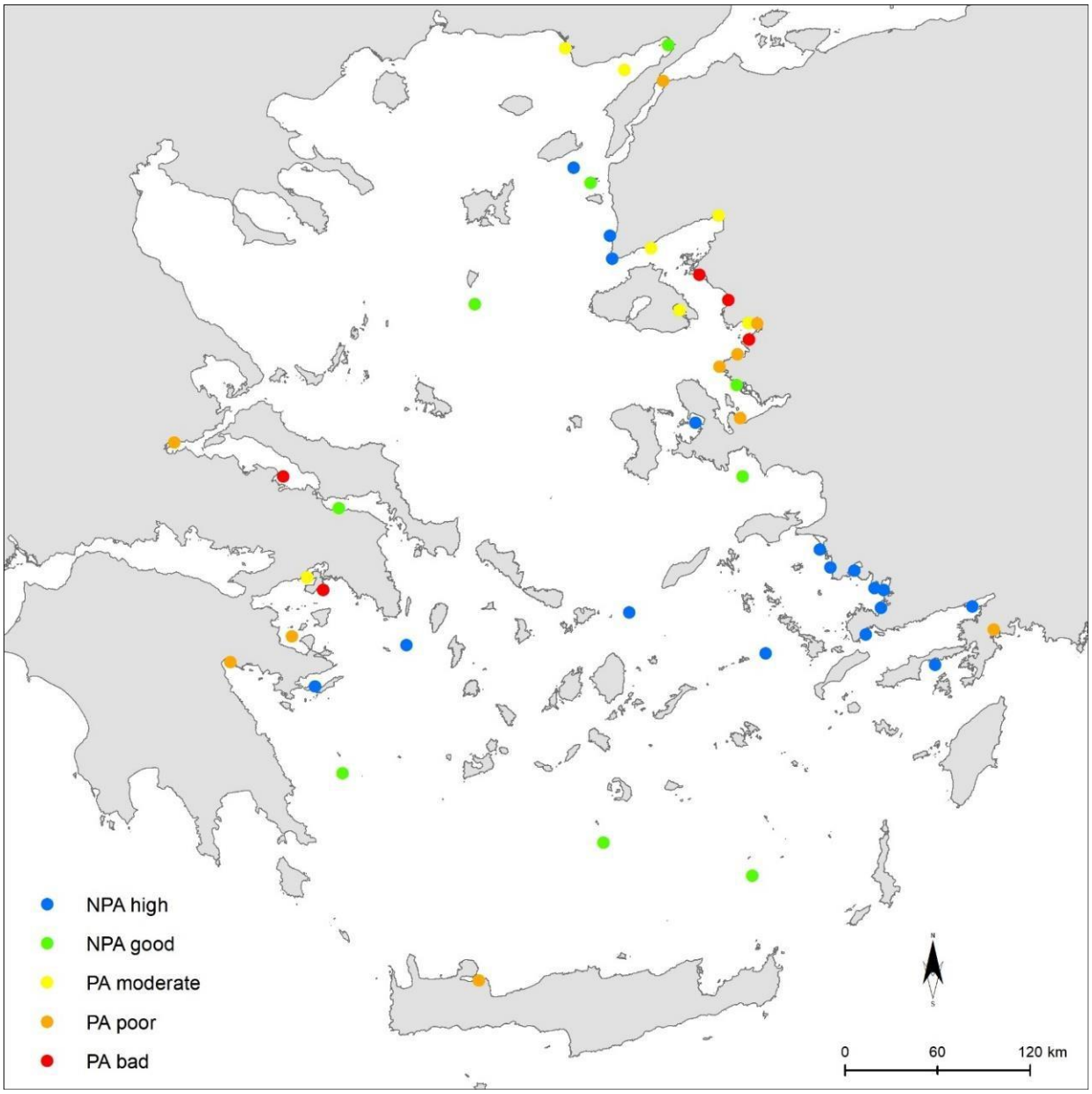

Figure AEGS 3.1.4.1.3.C. Results of the CHASE+ assessment methodology to assess the environmental status of Σ_5 PAHs in sediments in the AEGS, using AEL_BACs as thresholds. Criteria for Σ_5 PAHs were not adopted in Decisions IG.22/7 and IG.23/6 (COP 19 and COP 20) and not addressed in UNEP/MED WG. 533/3. Here we used the sum of the individual BAC values as provided for the 5 PAHs compounds in UNEP/MED WG. 533/3 as Σ_5 PAHs_BAC. Stations in blue - NPAhigh (CR=0.0-0.5); stations in green- NPAgood (CR =0.5-1.0); Stations in yellow- PAmoderate (CR =1.0-2.0); stations in brown - PApoor (CR =2.0-5.0) and stations in red - PAbad (CR > 5.0). Blue and green stations are considered in GES; yellow, brown and red stations are considered non-GES.

Assessment of Σ_7 PCBs in sediments of the AEGS

431. Data on PCBs were reported only by Türkiye. The northern (except station D7 in the Dardanelles Strait) and southern part of the coast were in GES regarding Σ_7 PCBs in sediments (22 stations, 71% from the total number of stations) **(**Figure AEGS 3.1.4.1.4.C). The mid area, encompassing the coast around Aliaga, Yenisakran and Candarli was classified as non-GES, in particular the stations inside the bay (9 stations, 29% from the total number of stations) which determined this area as an affected one. There are not enough data to classify the whole AEGS sub-division regarding data reported for Σ_7 PCBs in sediments.

432. The AEGS sub-division could not be classified regarding assessment of Σ_7 PCBs in sediments due to lack of data. An affected, non-GES area was identified in the coast around Aliaga, Yenisakran and Candarli. The north-eastern and south-eastern coast were in-GES regarding assessment of data on Σ_7 PCBs in sediments.

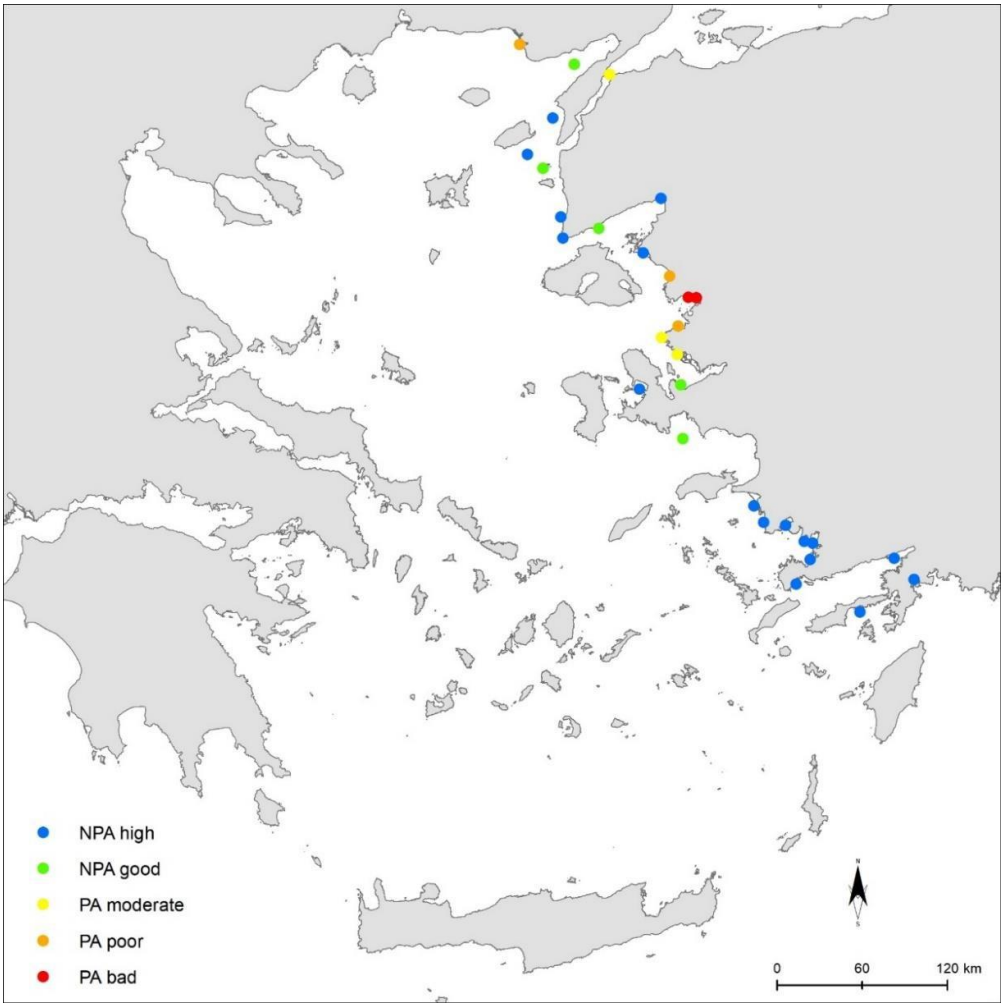

Figure AEGS 3.1.4.1.4.C. Results of the CHASE+ assessment methodology to assess the environmental status of Σ_7 PCBs in sediments in the AEGS, using AEL_BACs as thresholds. Stations in blue - NPAhigh (CR=0.0-0.5); stations in green- NPAgood (CR =0.5-1.0); Stations in yellow- PAmoderate (CR =1.0-2.0); stations in brown - PApoor (CR =2.0-5.0) and stations in red - PAbad (CR > 5.0). Blue and green stations are considered in GES; yellow, brown and red stations are considered non-GES.

Organochlorinated contaminants other than PCBs in sediments of the AEGS

433. Data for Organochlorinated contaminants were reported only by Türkiye. Dieldrin in all stations were below detection limit (reported as 0 μg/kg dry wt) while data for γ-HCH (Lindane) ranged from below detection limit to 0.14 μg/kg dry wt with an average and median concentration of 0.036 and 0.013 μg/kg dry wt, respectively. The BAC value is not set for Lindane. Only EAC of 3 μg/kg dry wt was adopted by Decision IG.22/7. The concentrations reported for Lindane were well below the EAC value.

434. Therefore, the AEGS sub-division could not be classified regarding assessment of Organochlorinated contaminants other than PCBs in sediments due to lack of data.

b) The Levantine Sea Sub-division (LEVS)

Available data.

435. The available data for the assessment of the Levantine Sea are presented in Table 3.1.4.1.1.b. Data were available for TM (Cd, Hg and Pb) in sediments as available for Cyprus, Greece, Israel, Lebanon, Türkiye; TM in the fish *M. barbatus* as available for Cyprus, Israel, Lebanon, Türkiye; PAHs in sediments as available for Greece, Israel, Lebanon and Türkiye; some PAH compounds for *M. barbatus* as available for Cyprus and Türkiye; organochlorinated contaminants in sediments as available for Lebanon and Türkiye; and organochlorinated contaminants in *M. barbatus* as available for Cyprus, Lebanon and Türkiye.

436. No data were available for the southern coast nor for the southern offshore area of the LEVS.

437. The most data were available for TM in sediments. There were 136 data points in the database, with 135 data points for Cd, 133 for Hg and 136 for Pb. Data for TM in *M. barbatus* were as follows: 83 data points for Cd, 85 data points for Hg and 53 data points for Pb. Data for PAHs in sediments were available for 112 stations. Data on total 16 PAHs (Σ_{16} PAHs) in sediments were reported for 75 stations while for 33 stations data available were for Σ_5 PAHs[84]. Data for some of the PAHs compounds in *M. barbatus* were reported in 18 specimens. Data for total PCBs (Σ_7 PCBs[85]) in sediments were available for 52 stations. Data for Lindane and Dieldrin in sediments were available for 33 stations. In *M. barbatus* data for Σ_7 PCBs, Lindane, Dieldrin, Hexachlorobenzene and p,p'DDE were available in 12 samples.

438. Data were compiled from the IMAP-IS, as reported by 31st October 2022. As mentioned, additional data from the scientific literature were also used (Astrahan et al. 2017, Ghosn et al, 2020).

[84] Σ_5 PAHs is the sum of the concentrations of Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Indeno(1,2,3-cd)pyrene and Benzo(ghi)perylene. Turkiye reported also the concentration of Σ_4PAHs that is the sum of the first 4 compounds in Σ_5 PAHs. Both Σ_5 PAHs and Σ_4 PAHs are non-mandatory parameters for CI 17, whereby Σ_{16} PAHs, is a mandatory parameter.
[85] PCBs congeners 28,52,101,118,132,153,180

Table 3.1.4.1.1.b. Data availability by country and year for the assessment of EO 9 – CI 17 (contaminants) in the Levantine Sea Sub-division (LEVS) Sub-division of AEL, as available by up to 31st Oct 2022.

Source	IMAP_File	Country	Year	Cd	Hg	Pb	Σ_{16} PAHs	Σ_5 PAHs	Σ_7 PCBs	Lindane	Dieldrin
Sediment											
IMAP_IS	497	Cyprus	2017	7	7	7					
IMAP_IS	497[86]	Cyprus	2018	4	4	4					
IMAP_IS	634	Cyprus	2019	2	2	2		2			
IMAP_IS	634	Cyprus	2020	6	6	6		6			
IMAP_IS	634	Cyprus	2021	6	5	6					
IMAP_IS	652	Greece	2019	3	0	3	4*	4			
MED POL		Israel	2017	14	14	14					
IMAP_IS	585	Israel	2018	11	11	11					
IMAP_IS	531[87]	Israel	2019	16	16	16					
IMAP_IS	588	Israel	2020	14	14	14					
Lit[1]		Israel	2013&				52*	52			
IMAP_IS	118	Lebanon	2019	17	17	17	19		19		
Lit[2]		Lebanon	2017	2	3	3					
IMAP_IS	445	Türkiye	2018	33	33	33		33	33	33	33
M. barbatus											
IMAP_IS	636	Cyprus#	2020	6	6	6		6	8	8	8
IMAP_IS	636	Cyprus#	2021	8	8	8		6	4	4	4
IMAP_IS	585[88]	Israel	2018	13	13	0					
IMAP_IS	410	Israel	2019	7	7	0					
IMAP_IS	588	Israel	2020	10	12	0					
IMAP_IS	152	Lebanon	2019	14	14	14		6	3		
IMAP_IS	323	Türkiye	2015	25	25	25	25^				

[1]Astrahan et al. 2017; [2]Ghosn et al, 2020; * Data for individual concentrations for all congeners are available; ^Data for 8 congeners available for 25 samples in 5 stations; # Additional data available for Hexachlorobenzene and DDE(p,p'). & Data from 2013 were used because no newer data were available; In addition, the stations are located offshore, at depths deeper than 100 m, so that temporal changes are not expected.

439. Based on the available data, the assessment was performed for TM, Σ16 PAHs and Σ7 PCBs in sediment and for TM in M. barbatus. In addition, the LEVS was assessed regarding Σ5 PAHs as well. This is not a mandatory parameter, but it was included in the assessment given data availability for Türkiye, that increased the coverage of the assessment over a larger area of the LEVS. Therefore, an exception was made to possibly increase confidence of the assessment. When possible, a qualitative description was provided for the additional parameters or stations.

Setting the GES/non-GES boundary value/threshold for the CHASE+ application in the LEVS.

440. The thresholds used for the CHASE+ assessment methodology were the updated sub-regional BACs .If the Sub-regional BAC was not available, the regional MED_BACs were used as thresholds in the present assessment. Table 3.1.4.1.2.b. summarizes the thresholds values, the same ones used in the assessment of AEGS sub-division within the Aegean Levantine Seas Sub-region (AEL).

[86] Replaced IMAP file 125
[87] Replaced IMAP file 410
[88] Replaced IMAP file 71

Table 3.1.4.1.2.b. Summary of the threshold values used in present pilot application for GES assessment of the Levantine and Aegean Seas sub-divisions. MedEACs are presented for comparison.

	AEL_BAC	MED_BAC	MedEAC
Sediments, µg/kg dry wt			
Cd	118	161	1200
Hg	47.3	75	150
Pb	23511	22500	46700
Σ_{16} PAHs	41	32	4022*
Σ_5 PAHs^	17.2	31.8	
Σ_7 PCBs	0.19	0.40	68+
***M. barbatus*, µg/kg wet wt**			
Cd	7.2	7.8	50
Hg	67.4	81.2	1000
Pb	27	36.6	300

* ERL value derived for the sum of 16 PAHs by Long et al., 1995, do not appear in the Decisions of COP; + sum of the individual MedEACs values of the 7 PCB compounds as they appear in Decision IG.23/6;^Values are not set by Decision IG.23/6, therefore the BAC value for Σ5 PAHs is calculated as a sum of the individual BAC values as provided for the 5 PAHs compounds.

Integration of the areas of assessment for the LEVS

441. The locations of the sampling stations are presented in Figures LEVS 3.1.4.1.1.C– LEVS 3.1.4.1.5.C.

442. The locations of the sampling stations were sorted by group of contaminants. TM, PAH and Organochlorinated contaminants in sediments for Lebanon and Türkiye were determined in samples collected from the same stations at the same date. PAHs in sediments from Israel were collected from stations different from the stations sampled for TM in sediments and at a different date. The sampling sites for the fish *M. barbatus* in Lebanon, Israel and Türkiye were located in the areas close to the sediment samples, but did not encompass one specific station, only a fishing area. In Cyprus, one of the two sampling sites for the fish *M. barbatus* was located close to sediment stations and one far from sediment stations.

443. Further to IMAP implementation, the monitoring stations were considered for grouping in the two main assessment zones i.e., the coastal (within 1 nm from the shore) and offshore zones. The sampling stations for TM in sediments for Israel can be considered all coastal, except 2 stations that can be considered offshore stations. In Lebanon, 5 out of 20 stations can be considered offshore stations. In Cyprus, 8 stations can be considered coastal and 3 stations as offshore. In Greece, 1 station was coastal and 3 stations were offshore stations. In Türkiye, four stations can be considered offshore stations. The stations in Iskenderun Bay, Antalya Bay, the bay off Mersin and Erdemli and inlets can be considered coastal stations. No stations with data for PAHs in sediments in Israel can be considered coastal i.e. there were 52 stations that can be considered offshore stations. The grouping of stations for PAHs and organochlorinated contaminants in sediments for Lebanon and Türkiye was the same as for TM. TM in *M. barbatus* were determined in samples collected from stations that can be considered offshore stations in Israel, Cyprus and Lebanon. In Türkiye all stations can be considered coastal, with exception of one station that can be classified as offshore station. Due to the limited number of data points, more so if dividing into coastal and offshore stations, the spatial nesting of stations in spatial assessment units (SAUs) to the level considered meaningful for IMAP CI 17 was not possible in LEVS. Spatial nesting would decrease the reliability and the representativeness of each station for the assessment of the Levantine Sea Sub-division. Therefore, at this stage, the assessment was based on specific stations irrespective of their positions either in offshore or coastal zones.