

Supplementary material for the paper

Screening for Organic Pollutants in the Black Sea turbot (*Scophthalmus maeoticus*)

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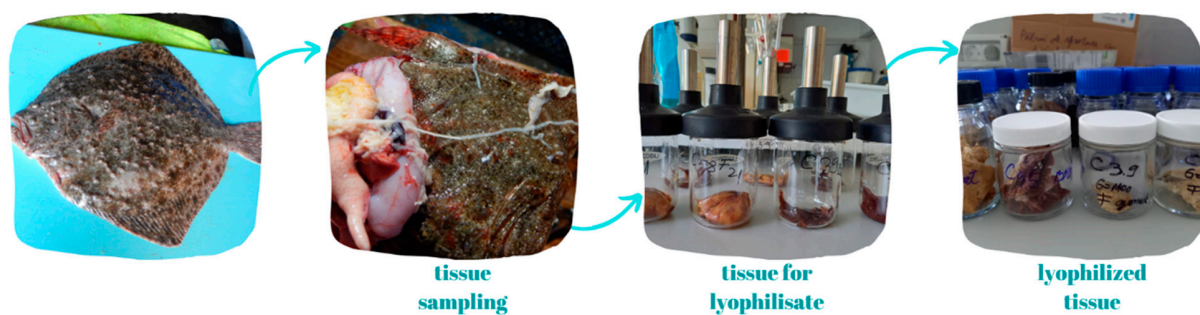


Figure S1. The lyophilization stages of turbot tissues

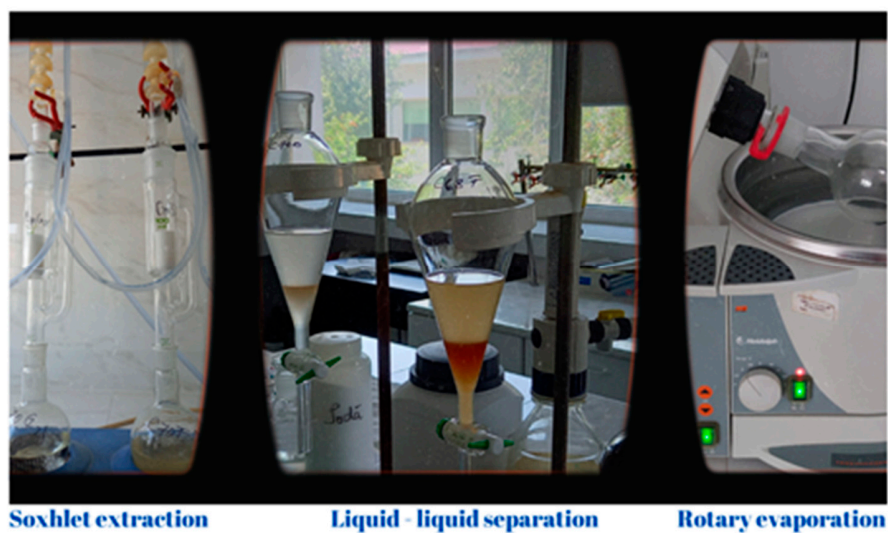


Figure S2. PAHs extraction steps.

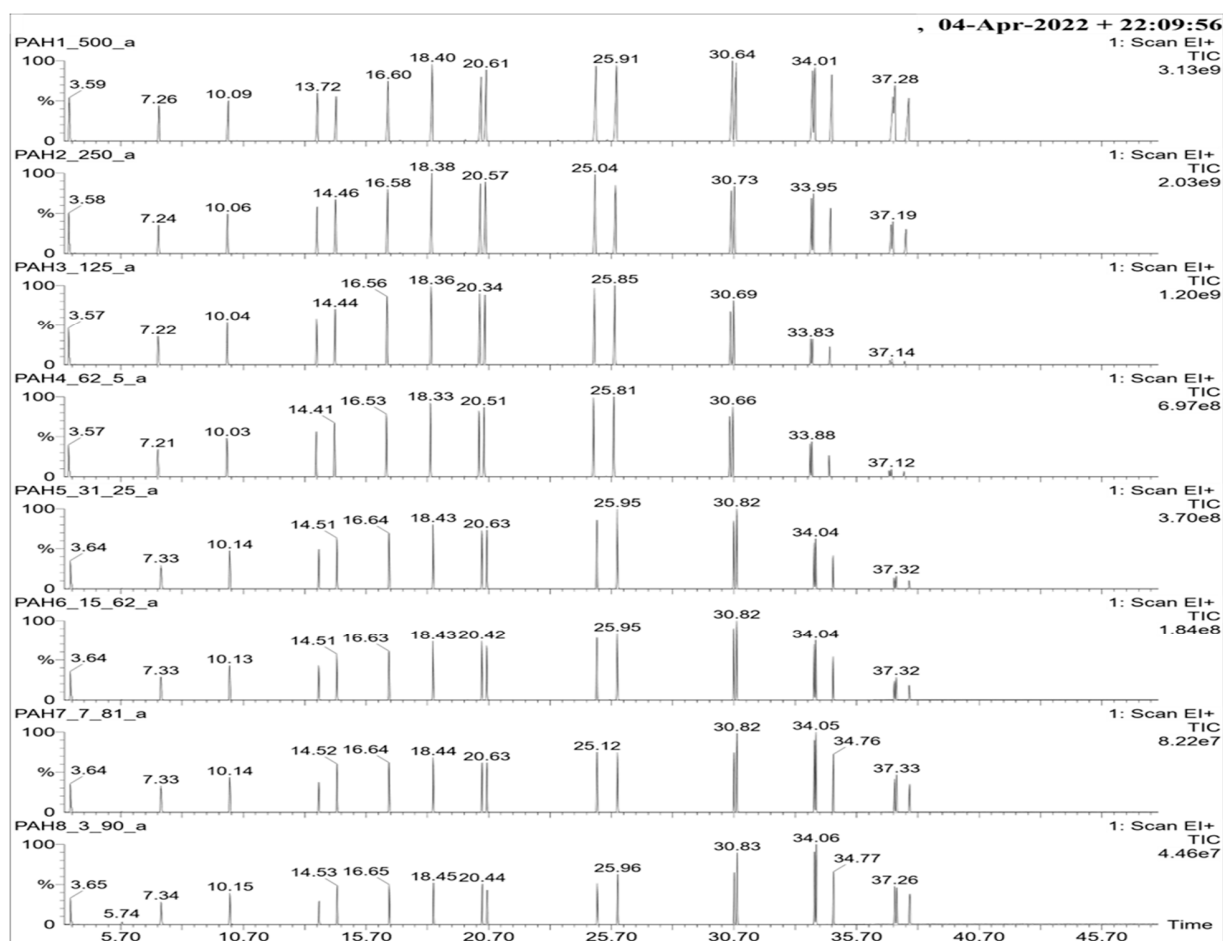


Figure S3. Standard solutions chromatogram of PAHs.

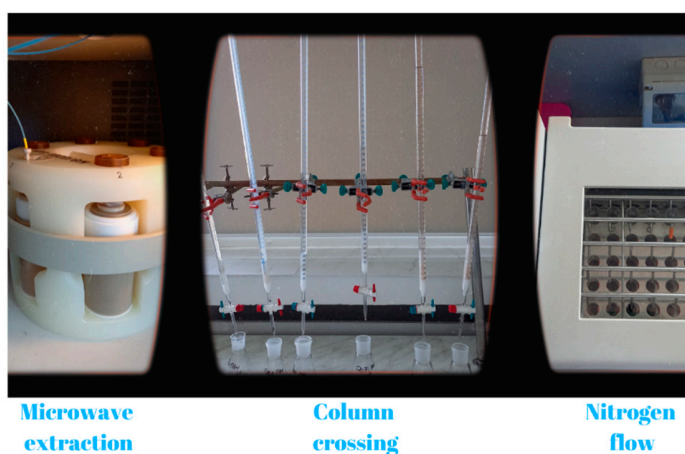


Figure S4. The stages of PCBs and OCPs extraction.

Table S1. ANOVA results for Water samples

Anova: Single Factor

SUMMARY				
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
S PAH water (µg/L)	7	1.222303	0.174615	0.007969
S OCP water (µg/L)	7	111.3593	15.90848	54.75654
S PCB water (µg/L)	7	0.294714	0.042102	7.21E-05

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	1165.065	2	582.5327	31.9111	1.21E-06	3.554557
Within Groups	328.5875	18	18.25486			
Total	1493.653	20				

Table S2. ANOVA results for Sediment samples

Anova: Single Factor

SUMMARY				
<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
S PAH sediments (µg/g)	7	0.323621	0.046232	0.001151
S OCP sediments (µg/g)	7	3.030075	0.432868	0.692379
S PCB sediments (µg/g)	7	0.697275	0.099611	0.008356

ANOVA						
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0.614594	2	0.307297	1.313449	0.293459	3.554557
Within Groups	4.211312	18	0.233962			
Total	4.825905	20				

Table S3. Correlations coefficients between PAHs individual components in dry tissues and their content in seawater

Variable	Marked correlations are significant at $p < .05000$ N=7							Indeno(1,2,3-c,d)pyrene ($\mu\text{g/L}$)
	Naphtalene ($\mu\text{g/L}$)	Fluorene ($\mu\text{g/L}$)	Phenanthrene ($\mu\text{g/L}$)	Anthracene ($\mu\text{g/L}$)	Fluoranthene ($\mu\text{g/L}$)	Pyrene ($\mu\text{g/L}$)	Benzo[a]anthracene ($\mu\text{g/L}$)	
Naphtalene ($\mu\text{g/g}$ dry tissue)	0.74	-0.35	0.17	-0.35	0.66	0.66	0.75	0.64
Acenaphthylene ($\mu\text{g/g}$ dry tissue)	0.31	-0.05	0.17	-0.05	0.22	0.32	0.30	0.31
Acenaphthene ($\mu\text{g/g}$ dry tissue)	0.42	-0.21	0.09	-0.21	0.38	0.37	0.42	0.36
Fluorene ($\mu\text{g/g}$ dry tissue)	0.00	0.85	0.86	0.85	-0.52	0.31	-0.11	0.37
Phenanthrene ($\mu\text{g/g}$ dry tissue)	0.48	-0.39	-0.05	-0.39	0.53	0.38	0.51	0.35
Anthracene ($\mu\text{g/g}$ dry tissue)	0.67	-0.27	0.20	-0.27	0.57	0.62	0.67	0.60
Fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.34	1.00	0.77	1.00	-0.82	0.00	-0.45	0.07
Pyrene ($\mu\text{g/g}$ dry tissue)	-0.30	0.99	0.79	0.99	-0.79	0.04	-0.41	0.12
Benzo[a]anthracene ($\mu\text{g/g}$ dry tissue)	-0.52	-0.16	-0.53	-0.16	-0.21	-0.62	-0.47	-0.63
Chrysene ($\mu\text{g/g}$ dry tissue)	0.09	0.55	0.61	0.55	-0.28	0.30	0.01	0.34
Benzo[b]fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.47	-0.12	-0.45	-0.12	-0.21	-0.55	-0.43	-0.56
Benzo[k]fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.49	-0.13	-0.48	-0.13	-0.21	-0.57	-0.45	-0.58
Benzo[a]pyrene ($\mu\text{g/g}$ dry tissue)	0.41	0.28	0.58	0.28	0.08	0.55	0.36	0.57
Benzo (g,h,i)perylene ($\mu\text{g/g}$ dry tissue)	-0.50	-0.07	-0.42	-0.07	-0.26	-0.56	-0.46	-0.57
Dibenzo(a,h)anthracene ($\mu\text{g/g}$ dry tissue)	0.16	0.55	0.67	0.55	-0.24	0.38	0.08	0.42
Indeno(1,2,3-c,d)pyrene ($\mu\text{g/g}$ dry tissue)	-0.49	-0.10	-0.45	-0.10	-0.23	-0.56	-0.45	-0.57

Table S4. Correlations coefficients between PAHs individual components in dry tissues and their content in sediments

Variable	Marked correlations are significant at $p < .05000$ N=7									
	Naphtalene ($\mu\text{g/g}$)	Fluorene ($\mu\text{g/g}$)	Phenanthrene ($\mu\text{g/g}$)	Fluoranthene ($\mu\text{g/g}$)	Pyrene ($\mu\text{g/g}$)	Benzo[a]anthracene ($\mu\text{g/g}$)	Chrysene ($\mu\text{g/g}$)	Benzo[b]fluoranthene ($\mu\text{g/g}$)	Benzo[a]pyrene ($\mu\text{g/g}$)	Indeno(1,2,3- c,d)pyrene ($\mu\text{g/g}$)
Naphtalene ($\mu\text{g/g}$ dry tissue)	0.55	0.69	0.75	0.75	0.75	0.50	0.75	0.59	0.67	0.75
Acenaphthylene ($\mu\text{g/g}$ dry tissue)	0.15	0.24	0.30	0.30	0.30	0.28	0.30	0.30	0.32	0.30
Acenaphthene ($\mu\text{g/g}$ dry tissue)	0.32	0.39	0.42	0.42	0.42	0.28	0.42	0.33	0.38	0.42
Fluorene ($\mu\text{g/g}$ dry tissue)	-0.70	-0.45	-0.11	-0.11	-0.11	0.60	-0.11	0.47	0.30	-0.11
Phenanthrene ($\mu\text{g/g}$ dry tissue)	0.49	0.53	0.51	0.51	0.51	0.21	0.51	0.30	0.38	0.51
Anthracene ($\mu\text{g/g}$ dry tissue)	0.46	0.60	0.67	0.67	0.67	0.48	0.67	0.56	0.62	0.67
Fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.94	-0.76	-0.45	-0.45	-0.45	0.36	-0.45	0.20	-0.01	-0.45
Pyrene ($\mu\text{g/g}$ dry tissue)	-0.92	-0.73	-0.41	-0.41	-0.41	0.40	-0.41	0.24	0.03	-0.41
Benzo[a]anthracene ($\mu\text{g/g}$ dry tissue)	-0.05	-0.27	-0.47	-0.47	-0.47	-0.64	-0.47	-0.64	-0.62	-0.47
Chrysene ($\mu\text{g/g}$ dry tissue)	-0.42	-0.23	0.01	0.01	0.01	0.48	0.01	0.40	0.29	0.01
Benzo[b]fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.07	-0.26	-0.43	-0.43	-0.43	-0.56	-0.43	-0.56	-0.55	-0.43
Benzo[k]fluoranthene ($\mu\text{g/g}$ dry tissue)	-0.06	-0.26	-0.45	-0.45	-0.45	-0.59	-0.45	-0.59	-0.57	-0.45
Benzo[a]pyrene ($\mu\text{g/g}$ dry tissue)	-0.08	0.13	0.36	0.36	0.36	0.62	0.36	0.59	0.54	0.36
Benzo (g,h,i)perylene ($\mu\text{g/g}$ dry tissue)	-0.12	-0.30	-0.46	-0.46	-0.46	-0.55	-0.46	-0.57	-0.56	-0.46
Dibenzo(a,h)anthracene ($\mu\text{g/g}$ dry tissue)	-0.40	-0.18	0.08	0.08	0.08	0.56	0.08	0.48	0.37	0.08
Indeno(1,2,3-c,d)pyrene ($\mu\text{g/g}$ dry tissue)	-0.09	-0.28	-0.45	-0.45	-0.45	-0.57	-0.45	-0.58	-0.56	-0.45

Table S5. Correlations coefficients between OCPs individual components in dry tissues and their content in seawater

Variable	Marked correlations are significant at $p < .05000$ N=7							
	HCB ($\mu\text{g/L}$)	Lindan ($\mu\text{g/L}$)	Aldrin ($\mu\text{g/L}$)	p,p'DDE ($\mu\text{g/L}$)	Dieldrin ($\mu\text{g/L}$)	Endrin ($\mu\text{g/L}$)	p,p'DDD ($\mu\text{g/L}$)	p,p'DDT ($\mu\text{g/L}$)
HCB ($\mu\text{g/g}$ dry tissue)	-0.41	-0.16	-0.06	0.44	-0.28	-0.31	-0.16	-0.45
Lindan ($\mu\text{g/g}$ dry tissue)	-0.42	-0.33	-0.22	0.56	-0.45	-0.26	-0.33	-0.56
Heptaclor ($\mu\text{g/g}$ dry tissue)	-0.48	0.03	0.14	0.37	-0.12	-0.44	0.02	-0.40
Aldrin ($\mu\text{g/g}$ dry tissue)	-0.52	-0.24	-0.11	0.58	-0.39	-0.37	-0.24	-0.59
p,p'DDE ($\mu\text{g/g}$ dry tissue)	-0.43	0.91	0.97	-0.25	0.76	-0.73	0.91	0.13
Dieldrin ($\mu\text{g/g}$ dry tissue)	-0.38	0.69	0.75	-0.14	0.56	-0.60	0.69	0.05
Endrin ($\mu\text{g/g}$ dry tissue)	-0.01	-0.24	-0.23	0.17	-0.24	0.09	-0.25	-0.14
p,p'DDD ($\mu\text{g/g}$ dry tissue)	-0.50	-0.26	-0.13	0.57	-0.40	-0.35	-0.26	-0.58
p,p'DDT ($\mu\text{g/g}$ dry tissue)	-0.21	0.99	1.00	-0.47	0.90	-0.57	0.99	0.37

Table S6. Correlations coefficients between OCPs individual components in dry tissues and their content in sediments

Variable	Marked correlations are significant at $p < .05000$ N=7					
	HCB ($\mu\text{g/g}$)	Lindan ($\mu\text{g/g}$)	Aldrin ($\mu\text{g/g}$)	Dieldrin ($\mu\text{g/g}$)	Endrin ($\mu\text{g/g}$)	p,p'DDD ($\mu\text{g/g}$)
HCB ($\mu\text{g/g}$ dry tissue)	0.21	-0.10	-0.10	-0.10	-0.06	-0.40
Lindan ($\mu\text{g/g}$ dry tissue)	0.12	-0.26	-0.26	-0.26	-0.22	-0.41
Heptaclor ($\mu\text{g/g}$ dry tissue)	0.37	0.09	0.09	0.09	0.13	-0.48
Aldrin ($\mu\text{g/g}$ dry tissue)	0.24	-0.16	-0.16	-0.16	-0.11	-0.51
p,p'DDE ($\mu\text{g/g}$ dry tissue)	0.87	0.95	0.95	0.95	0.96	-0.46
Dieldrin ($\mu\text{g/g}$ dry tissue)	0.71	0.73	0.73	0.73	0.75	-0.41
Endrin ($\mu\text{g/g}$ dry tissue)	-0.14	-0.24	-0.24	-0.24	-0.23	0.00
p,p'DDD ($\mu\text{g/g}$ dry tissue)	0.22	-0.18	-0.18	-0.18	-0.13	-0.49
p,p'DDT ($\mu\text{g/g}$ dry tissue)	0.76	1.00	1.00	1.00	1.00	-0.26

Table S7. Correlations coefficients between PCBs individual components in dry tissues and their content in seawater

Variable	Marked correlations are significant at $p < .05000$ N=7				
	PCB52 ($\mu\text{g/L}$)	PCB101 ($\mu\text{g/L}$)	PCB118 ($\mu\text{g/L}$)	PCB153 ($\mu\text{g/L}$)	PCB180 ($\mu\text{g/L}$)
PCB28 ($\mu\text{g/g}$ dry tissue)	-0.30	0.25	0.52	0.30	0.48
PCB52 ($\mu\text{g/g}$ dry tissue)	-0.46	0.18	0.64	0.46	0.62
PCB101 ($\mu\text{g/g}$ dry tissue)	-0.48	0.18	0.66	0.48	0.64
PCB118 ($\mu\text{g/g}$ dry tissue)	-0.50	0.20	0.70	0.50	0.68
PCB153 ($\mu\text{g/g}$ dry tissue)	-0.36	0.41	0.71	0.36	0.64
PCB138 ($\mu\text{g/g}$ dry tissue)	-0.49	0.17	0.68	0.49	0.66
PCB180 ($\mu\text{g/g}$ dry tissue)	-0.31	0.28	0.55	0.31	0.51

Table S8. Correlations coefficients between PCBs individual components in dry tissues and their content in sediments

Variable	Marked correlations are significant at $p < .05000$ N=7			
	PCB28 ($\mu\text{g/g}$)	PCB52 ($\mu\text{g/g}$)	PCB101 ($\mu\text{g/g}$)	PCB138 ($\mu\text{g/g}$)
PCB28 ($\mu\text{g/g}$ dry tissue)	-0.33	-0.36	-0.25	-0.25
PCB52 ($\mu\text{g/g}$ dry tissue)	-0.29	-0.34	-0.18	-0.18
PCB101 ($\mu\text{g/g}$ dry tissue)	-0.29	-0.34	-0.18	-0.18
PCB118 ($\mu\text{g/g}$ dry tissue)	-0.33	-0.38	-0.20	-0.20
PCB153 ($\mu\text{g/g}$ dry tissue)	-0.52	-0.56	-0.41	-0.41
PCB138 ($\mu\text{g/g}$ dry tissue)	-0.29	-0.35	-0.17	-0.17
PCB180 ($\mu\text{g/g}$ dry tissue)	-0.36	-0.40	-0.28	-0.28

Table S9. ANOVA results for the total content of OPs in turbot tissues samples

Anova: Single Factor

SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
S PAH (µg/g dry tissue)	7	1311.501	187.3573	60100.69
S OCP (µg/g dry tissue)	7	4219.423	602.7747	456537
S PCB (µg/g dry tissue)	7	363.3689	51.90984	14513.78

ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	1153529	2	576764.6	3.257628	0.062019	3.554557
Within Groups	3186909	18	177050.5			
Total	4340438	20				