

Table S1. Main geo-morphological and hydrographic features of the coastal lagoons of the Circeo National Park (Fogliano, Caprolace and Sabaudia).

	FOGLIANO	CAPROLACE	SABAUDIA
Latitude	41°24'	41°21'	41°16'
Longitude	12°54'	12°58'	13°02'
Perimeter (km)	11.2	8.4	20.1
Surface (ha)	404	226	400
Max Depth (m)	2.0	2.9	10.0
Mean Depth (m)	0.9	1.3	4.5
Volume (m ³)	3,616,000	2,923,783	14,000,000
Inlet (n)	2	2	2
Tributary (n)	0	0	3
Tidal range (m)	0.23	0.21	0.20
Water exchange rate (days)	60	90	300
Average water temperature (°C)	20.3	19.4	23.5
Average Salinity (PSU)	40.6	39.1	28.9

Table S2. Anthropogenic pressures indicators and impact score used for the Pressures index modified by [1]. EQS: ecological quality standards.

INDICATOR	Description	IMPACT SCORE					
		No change (0)	Very low (1)	Low (3)	Medium (5)	High (7)	Very high (9)
MORPHOLOGIC AND HYDROLOGY CHANGES							
EXCHANGE	Geomorphic types according to mean water renewal time (days)			>100 <250	<100	>250	
BANKS	% of natural banks	100% natural	5-10%	10-25%	25-50%	50-75%	>75 % modified
TIDAL INLET	Status and efficiency	High efficiency, natural functioning		A functional tidal channel, maintenance of secondary canals	Maintenance required on tidal channel	Poor efficiency due to no maintenance	
FW SUPPLY	Surface freshwater tributaries and their functionality	Original tributaries network		Natural functionality and/or partially managed (water pump)	Tributaries diverted, possible fresh water revenue sources	Total freshwater inputs diversion	
LANDSCAPE AND USE OF RESOURCE							
LANDSCAPE	% of antropogenically affected land	100% Natural	80%	60%	30%	10%	0%
AQUACULTURE	kg of mussels per linear meter of rope or	0 Absent	<10 kg/ml	>10 kg/m <25	>25 kg/m < 50	> 50 kg/m < 75	> 75
	Production (t/year)	0 Absent	<100	>100 <500	> 500 < 1000	>1000 <5000	>5000
FISHERY	Fyke net density per hectare or	0 Absent	0-48	48-147	147-238	238-364	>364
	Production (t/year)	0 Absent	<100	>100 <500	> 500 < 1000	>1000 <5000	>5000
FIXED BARRIER	Closed months per year	0 Absent	1	2	4	6	> 6

(e.g. sluice, fishing barrier)

WATER QUALITY

% OD	Dissolved Oxygen saturation > 80% for 95% of the time	Not applicable	> 80 %	70 < % < 80	50 < % ≤ 70	20 < % ≤ 50	≤ 20 %
CHL-A	90th percentile of the seasonal values of Chlorophyll-a	Not applicable	< 2.45 µg l ⁻¹	2.45 < µg l ⁻¹ < 3.65	3.65 < µg l ⁻¹ < 10.06	10.06 < µg l ⁻¹ < 19.94	> 20 µg l ⁻¹
DIN	Seasonal average of Dissolved Inorganic Nitrogen	Not applicable	< 95.46 µg l ⁻¹	95.46 < µg l ⁻¹ < 254.49	254.49 < µg l ⁻¹ < 394.23	394.23 < µg l ⁻¹ < 601.47	> 601.47 µg l ⁻¹
RP	Seasonal average of Reactive Phosphorus			[RP] < 0.48 µM (15 µg/L c.a.)	[RP] > 0.48 µM (15 µg/L c.a.)		

Table S3. List of metrics with description and categories for the pre-selection criteria [2].

METRIC CODE	DESCRIPTION
TAXONOMIC ASPECTS	
1 S	Species diversity
2 N	Total abundance
3 B	Total biomass (g)
4 d_N	Density (n° 100m ⁻²)
5 d_B	Biomass density (n° 100m ⁻²)
6 B.N	Average individual weight (B/N ratio; g)
7 d..N	Margalef index [(S-1)/ln(N+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
8 d..B	Margalef index [biomass (S-1)/ln(B+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
9 Indic	Number of indicator species (of naturalistic interest)
10 Indic_bisPA	Presence of indicator species (of naturalistic interest)
11 SdomN	Abundance dominance
12 d..domN	Margalef index for dominant species
13 SdomB	Biomass dominance
14 d..domB	Margalef index for dominant species (biomass)
HABITAT USE (HUFUG)	
15 S_RS	Number of resident species
16 N_RS	Abundance of resident species
17 B_RS	Biomass of resident species
18 d_N_RS	Resident density (n° 100m ⁻²)
19 d_B_RS	Resident biomass density (g 100m ⁻²)
20 B.N_RS	Average individual weight of resident species (B/N ratio; g)
21 d..RS	Margalef index for resident species [(S-1)/ln(N+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
22 d..RS_B	Margalef index for resident species [biomass (S-1)/ln(B+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
23 S_migr	Number of marine migrant species
24 N_migr	Abundance of marine migrant species
25 B_migr	Biomass of marine migrant species
26 d_N_migr	Marine migrant density (n° 100m ⁻²)
27 d_B_migr	Marine migrant biomass density (g 100m ⁻²)
28 B.N_migr	Average individual weight of estuarine resident species (B/N ratio; g)
29 d..migr	Margalef index for marine migrant species [(S-1)/ln(N+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
30 d..migr_B	Margalef index for marine migrant species [biomass (S-1)/ln(B+1): if S = 0 -> d' = 0; if -> S = 1 - d' = 0.01]
31 S_RSperc	Relative number of resident species
32 S_migrperc	Relative number of marine migrant species
33 N_RSperc	Relative abundance of resident species
34 N_migrperc	Relative abundance of marine migrant species
35 B_RSperc	Relative biomass of resident species
36 B_migrperc	Relative biomass of marine migrant species
37 Ebal_N	EU guild abundance balance $\pi = N_{rel} \sum d_i$ i-ma guild (i = RS,MM,D,F,MS) (min = 1, max = 2.24) (Jordan and Vaas, 2000)

38	MEbal_B	EU guild biomass balance $\pi = \sum_{i=1}^n \frac{d_i}{i}$ (i = RS,MM,D,F,MS) (min = 1, max = 2.24) (Jordan and Vaas, 2000) TROPIC WEB (FMFG)
39	S_Bv	Number of benthivorous species (criterion in Franco et al. 2008)
40	N_Bv	Abundance of estuarine benthivorous species
41	B_Bv	Biomass of estuarine benthivorous species
42	d_N_Bv	Benthivorous species density (n° 100 m ⁻²)
43	d_B_Bv	Benthivorous species biomass density (g 100 m ⁻²)
44	B.N_Bv	Average individual weight of benthivorous species (B/N ratio; g)
45	d..Bv_N	Margalef index for benthivorous species $[(S-1)/\ln(N+1)]$: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
46	d..Bv_B	Margalef index for benthivorous species [biomass $(S-1)/\ln(B+1)$]: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
47	S_HZP	Number of Hyperbenthivorous/Zooplanktivorous/Piscivorous species (criterion in Franco et al. 2008)
48	N_HZP	Abundance of Hyperbenthivorous/Zooplanktivorous/Piscivorous species
49	B_HZP	Biomass of estuarine benthivorous species
50	d_N_HZP	Hyperbenthivorous/Zooplanktivorous/Piscivorous species density (n° 100 m ⁻²)
51	d_B_HZP	Hyperbenthivorous/Zooplanktivorous/Piscivorous species biomass density (g 100 m ⁻²)
52	B.N_HZP	Average individual weight of Hyperbenthivorous/ Zooplanktivorous/ Piscivorous species (B/N ratio; g)
53	d..HZP_N	Margalef index for Hyperbenthivorous/ Zooplanktivorous/ Piscivorous species $[(S-1)/\ln(N+1)]$: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
54	d..HZP_B	Margalef index for Hyperbenthivorous/ Zooplanktivorous/ Piscivorous species [biomass $(S-1)/\ln(B+1)$]: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
55	S_DV	Number of detritivorous species (criterion in Franco et al., 2008)
56	N_DV	Abundance of detritivorous species
57	B_DV	Biomass of detritivorous species
58	d_N_DV	Detritivorous species density (n° 100 m ⁻²)
59	d_B_DV	Detritivorous species biomass density (g 100 m ⁻²)
60	B.N_DV	Average individual weight of detritivorous species (B/N ratio; g)
61	d..DV_N	Margalef index for detritivorous species $[(S-1)/\ln(N+1)]$: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
62	d..DV_B	Margalef index for detritivorous species [biomass $(S-1)/\ln(B+1)$]: if $S = 0 \rightarrow d' = 0$; if $S = 1 \rightarrow d' = 0.01$
63	S_Bv_per	Relative number of benthivorous species
64	S_HZP_per	Relative number of Hyperbenthivorous/Zooplanktivorous/Piscivorous species
65	S_DV_per	Relative number of detritivorous species
66	N_Bv_per	Relative abundance of benthivorous species
67	N_HZP_per	Relative abundance of Hyperbenthivorous/Zooplanktivorous/Piscivorous species
68	N_DV_per	Relative abundance of detritivorous species
69	B_Bv_per	Relative biomass of benthivorous species

70	B_HZP_per	Relative biomass of Hyperbenthivorous/Zooplanktivorous/Piscivorous species
71	B_DV_per	Relative biomass of detritivorous species
72	TBal_N	Throphic guild abundance balance $\pi = N \text{rel di i-ma guild (i = RS,MM,D,F,MS)}$ (min = 1, max = 2.24) (Jordan and Vaas, 2000)
73	TBal_B	Throphic guild biomass balance $\pi = N \text{rel di i-ma guild (i = RS,MM,D,F,MS)}$ (min = 1, max = 2.24) (Jordan and Vaas, 2000)

Table S4. Correlations between the two Fish –based Multi-metric indices (SeN-MMI and FyN-MMI) and level of multicollinearity among the metrics. Significant correlation values between MMIs, metrics are bolded and marked by a single ($p < 0.05$), double ($p < 0.01$) or triple ($p < 0.001$) asterisk. SeN-MMI metrics: Number of resident species (S_RS); Margalef index evaluated on the dominant species (D_domN); abundance density of detritivorous (d_N_DV); biomass density of resident species (d_B_RS). FyN-MMI metrics: Margalef index evaluated on the abundance of estuarine resident species (D_RS(N)); biomass density of benthivorous species (d_B_Bv); mean individual weight of Hyperbenthivorous/Zooplanktivorous/Piscivorous species (B/N_HZP); Margalef index evaluated on the abundance of benthivorous species (D_Bv(N)).

	SeN -MMI	S_RS	d_B_RS	d_N_DV	D_domN	FyN-MMI	D_RS(N)	d_B_Bv	D_Bv(N)	B/N_HZP
SeN -MMI		0.623***	0.372***	0.358***	0.394***	0.261*	0.177	-0.031	0.117	0.134
S_RS	0.623***		0.15	-0.112	0.232**	0.402***	0.145	0.185	0.358**	0.214
d_B_RS	0.372***	0.15		0.102	-0.317***	0.129	0.212	-0.058	0.062	-0.101
d_N_DV	0.358***	-0.112	0.102		-0.096	0.017	0.113	-0.127	-0.033	-0.102
D_domN	0.394***	0.232**	-0.317***	-0.096		0.173	0.027	0.037	0.196	0.14
FyN-MMI	0.261*	0.402***	0.129	0.017	0.173		0.665***	0.270*	0.663***	0.280*
D_RS(N)	0.177	0.145	0.212	0.113	0.027	0.665***		-0.159	0.456***	-0.176
d_B_Bv	-0.031	0.185	-0.058	-0.127	0.037	0.270*	-0.159		-0.029	0.384**
D_Bv(N)	0.117	0.358**	0.062	-0.033	0.196	0.663***	0.456***	-0.029		-0.072
B/N_HZP	0.134	0.214	-0.101	-0.102	0.14	0.280*	-0.176	0.384**	-0.072	

References

1. Aubry, A. and Elliott, M. The use of environmental integrative indicators to assess seabed disturbance in estuaries and coasts: application to the Humber Estuary, UK. *Mar. Poll. Bull.* **2006**, *53*, 175–185. <https://doi.org/10.1016/j.marpolbul.2005.09.021>
2. Zucchetta, M., Scapin, L., Franco, A., & Franzoi, P. Uncertainty in developing fish based multi-metric indices. *Ecol. Ind.* **2020**, *108*, 105768. <https://doi.org/10.1016/j.ecolind.2019.105768>