

## Supplementary material

**Table S1.** Environmental characteristics and aspects of the ecology of the six estuaries sampled in this study, based on [61, 122, 123]. NA – no commercial fishing in these estuaries.

	<b>Port Stephens</b>	<b>Lake Macquarie</b>	<b>Pittwater</b>	<b>Botany Bay</b>	<b>Jervis Bay</b>	<b>St Georges Basin</b>
<b>Estuary group / type [61]</b>	Tide-dominated estuary / drowned valley estuary	Wave-dominated estuary / barrier estuary	Tide-dominated estuary / drowned valley estuary	Bay / ocean embayment	Bay / ocean embayment	Wave-dominated estuary / barrier estuary
<b>Catchment area (km<sup>2</sup>) [122]</b>	296.77	604.39	50.77	54.87	32.39	315.75
<b>Entrance condition [122]</b>	Open	Open/ Trained	Open	Open	Open	Open
<b>Estuary area (km<sup>2</sup>, saltmarsh excluded) [122]</b>	123.75	113.21	18.36	38.79	122.41	40.76
<b>Area of seagrass (km<sup>2</sup>) [122]</b>	12.594	14.633	1.855	5.358	5.534	3.170
<b>Area of <i>Posidonia australis</i> (km<sup>2</sup>) [123]</b>	4.097	0.991	1.245	3.151	5.131	1.401
<b>average depth (m) [122]</b>	14.07	5.71	9.90	11.36	16.16	5.28
<b>Estuary volume (MI) [122]</b>	1741516	646274	181836	440816	1977656	215079
<b>Presence of Marine Park</b>	Port Stephens - Great Lakes Marine Park	no	no	no	Jervis Bay Marine Park	no
<b>Approx distance of sampled area from the ocean (m)</b>	6,685	6,270	1,326	3,470	7,790	8,280
<b>Annual commercial fish catch t/km<sup>2</sup> [122]</b>	3.27	NA	1.99	NA	0	NA

**Table S2.** List of the sampling sites and variables obtained using Generalised Random Tessellation Structures (GRTS). Site 'ps7' was not included in the analyses because too deep and not representative of a seagrass habitat.

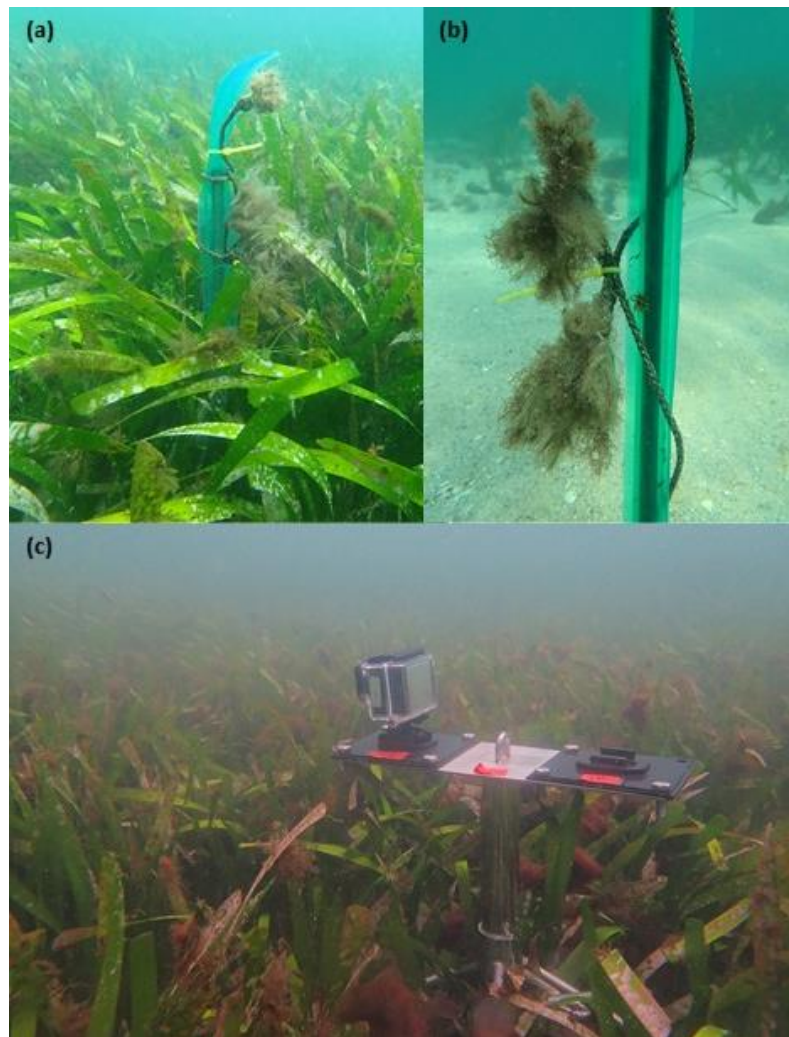
siteID	lat	long	depth	area_50	fragm_50	area_250	fragm_250	area_500	fragm_500	dist.edge	estuary
bb1	-34.0074	151.1981	1.7	45	0.711111	157	0.420382	3545	0.134838	10	botany_bay
bb10	-34.0066	151.1953	1.5	69	1.00E-05	268	0.30597	3970	0.137028	50	botany_bay
bb11	-34.003	151.1968	4	10	2.8	77	1.532468	3839	0.256838	0	botany_bay
bb12	-34.0072	151.1948	1	23	1.565217	134	0.492537	3605	0.119279	0	botany_bay
bb13	-34.0047	151.194	2.5	69	1.00E-05	305	1.00E-05	4357	0.280468	161.2452	botany_bay
bb14	-34.0054	151.1951	2	69	1.00E-05	305	1.00E-05	4274	0.190922	170.2939	botany_bay
bb15	-34.0032	151.1956	4	37	1.189189	155	0.658065	3924	0.293578	0	botany_bay
bb2	-34.0058	151.1934	1.6	69	1.00E-05	305	1.00E-05	3981	0.212007	111.8034	botany_bay
bb3	-34.0048	151.1971	2.4	69	1.00E-05	305	1.00E-05	4391	0.185835	130.384	botany_bay
bb4	-34.0054	151.1984	2.3	69	1.00E-05	305	1.00E-05	4260	0.161972	178.8854	botany_bay
bb5	-34.0035	151.1945	3	69	1.00E-05	251	0.398406	4146	0.30439	44.72136	botany_bay
bb6	-34.0061	151.1972	1.7	69	1.00E-05	305	1.00E-05	4170	0.152518	130.384	botany_bay
bb7	-34.0045	151.1968	2.5	69	1.00E-05	305	1.00E-05	4362	0.197616	100.4988	botany_bay
bb8	-34.0057	151.1988	2	69	1.00E-05	268	0.30597	3970	0.137028	50	botany_bay
bb9	-34.0028	151.1944	3.5	26	2.461538	171	0.807018	3776	0.338983	0	botany_bay
jb1	-35.0381	150.7862	2.1	37	1.189189	943	0.307529	1930	0.251813	-10	jervis_bay
jb10	-35.0391	150.7861	2.6	39	0.974359	924	0.324675	1997	0.24637	0	jervis_bay
jb11	-35.0415	150.7846	3.2	34	0.823529	921	0.277959	2140	0.214953	0	jervis_bay
jb13	-35.0397	150.7859	2.5	28	1.857143	915	0.301639	2093	0.242714	10	jervis_bay
jb14	-35.0385	150.785	4.7	69	1.00E-05	1191	0.263644	2065	0.247942	80	jervis_bay
jb15	-35.0405	150.7855	3.1	42	1.619048	873	0.293242	2127	0.22473	10	jervis_bay
jb18	-35.039	150.7857	3.9	61	0.688525	1095	0.284932	2041	0.244978	22.36068	jervis_bay
jb19	-35.0399	150.7863	1.6	15	2.4	706	0.371105	2024	0.244071	-10	jervis_bay
jb2	-35.0401	150.7859	2.3	21	2	778	0.326478	2084	0.234165	10	jervis_bay
jb3	-35.0393	150.785	4.5	69	1.00E-05	1201	0.249792	2158	0.240037	67.08204	jervis_bay
jb5	-35.0387	150.7864	1.5	22	1.272727	857	0.347725	1942	0.249228	0	jervis_bay
jb6	-35.0405	150.7842	4.9	69	1.00E-05	1144	0.243007	2256	0.214539	100	jervis_bay
jb7	-35.0409	150.7846	4	69	1.00E-05	1031	0.263822	2198	0.216561	44.72136	jervis_bay
jb8	-35.0395	150.7862	1.8	12	2.666667	805	0.342857	2019	0.250619	0	jervis_bay
jb9	-35.0411	150.7842	4.3	69	1.00E-05	1039	0.252166	2207	0.214771	53.85165	jervis_bay
lm1	-33.0484	151.6441	3	43	1.116279	1016	0.311024	2728	0.31305	0	lake_macquarie
lm10	-33.0478	151.6461	2.6	68	0.558824	1168	0.246575	2691	0.25641	30	lake_macquarie

lm11	-33.0493	151.6469	1	68	0.558824	1177	0.188615	2692	0.255572	30 lake_macquarie
lm12	-33.0501	151.6473	0.7	3	2.666667	772	0.212435	2522	0.239492	-40 lake_macquarie
lm14	-33.0483	151.6466	1.9	69	1.00E-05	1252	0.238019	2699	0.249722	94.33981 lake_macquarie
lm15	-33.0492	151.6472	1.3	55	0.690909	1113	0.19407	2652	0.241327	10 lake_macquarie
lm17	-33.0495	151.6459	1.7	69	1.00E-05	1342	0.184799	2773	0.291381	82.46211 lake_macquarie
lm19	-33.0492	151.6474	1	44	0.863636	1046	0.18738	2613	0.238041	0 lake_macquarie
lm2	-33.0487	151.6459	2.2	69	1.00E-05	1333	0.213053	2797	0.267429	100 lake_macquarie
lm3	-33.0489	151.6453	2.1	69	1.00E-05	1376	0.218023	2804	0.297432	82.46211 lake_macquarie
lm4	-33.0494	151.6473	1	35	0.857143	1003	0.187438	2613	0.239571	0 lake_macquarie
lm5	-33.0482	151.645	3.3	53	0.981132	1123	0.26358	2761	0.27816	0 lake_macquarie
lm7	-33.0486	151.6471	1.5	69	1.00E-05	1198	0.227045	2653	0.242744	58.30952 lake_macquarie
lm8	-33.0476	151.6446	3.2	1	4	770	0.350649	2646	0.273621	-22.3607 lake_macquarie
lm9	-33.0479	151.6446	3.5	13	2.923077	891	0.316498	2700	0.28	-10 lake_macquarie
pitt1	-33.5908	151.3208	1.3	32	0.9375	931	0.186896	3743	0.117553	0 pittwater
pitt11	-33.5903	151.3188	1.4	69	1.00E-05	1847	0.109367	4801	0.122474	194.1649 pittwater
pitt12	-33.5921	151.3181	2	69	1.00E-05	1533	0.190476	3786	0.178024	120.4159 pittwater
pitt14	-33.5894	151.3175	1.9	69	1.00E-05	1887	0.122946	4833	0.112559	82.46211 pittwater
pitt15	-33.5911	151.3188	1.6	69	1.00E-05	1664	0.11899	4454	0.142344	141.4214 pittwater
pitt16	-33.5927	151.3188	1.7	65	0.584615	1244	0.205788	3414	0.204452	28.28427 pittwater
pitt17	-33.5889	151.3154	2.9	40	1.3	1023	0.218964	3557	0.131572	0 pittwater
pitt20	-33.5911	151.3163	2.1	69	1.00E-05	1370	0.218978	3937	0.150876	14.14214 pittwater
pitt3	-33.5893	151.3194	1.5	69	1.00E-05	1883	0.110462	5168	0.098684	202.4846 pittwater
pitt4	-33.5914	151.3205	1.3	39	0.871795	962	0.178794	3830	0.132637	0 pittwater
pitt5	-33.5892	151.3144	3.3	1	4	604	0.31457	2773	0.164443	-40 pittwater
pitt6	-33.5884	151.3157	2.4	68	0.588235	1118	0.191413	3757	0.112856	-40 pittwater
pitt7	-33.5898	151.3201	1.4	69	1.00E-05	1579	0.127929	4896	0.100899	120.4159 pittwater
pitt8	-33.5922	151.3174	1.8	69	1.00E-05	1574	0.212198	3635	0.182118	86.02325 pittwater
pitt9	-33.5903	151.3147	3.1	13	2.153846	694	0.32853	3242	0.160395	-10 pittwater
ps10	-32.7174	152.1227	2.7	45	0.711111	254	0.488189	463	0.414687	10 port_stephens
ps11	-32.7188	152.128	1.4	58	0.62069	351	0.31339	499	0.352705	0 port_stephens
ps12	-32.7185	152.1262	1.1	29	1.103448	402	0.368159	600	0.37	-10 port_stephens
ps13	-32.7176	152.1238	2	49	0.693878	289	0.477509	585	0.382906	10 port_stephens
ps14	-32.7176	152.122	1.1	39	0.820513	213	0.507042	398	0.442211	0 port_stephens
ps15	-32.7187	152.1279	1.5	63	0.603175	361	0.32687	505	0.352475	14.14214 port_stephens
ps16	-32.7177	152.1252	2.3	51	0.705882	337	0.41543	624	0.36859	20 port_stephens
ps17	-32.7177	152.1237	1.6	49	0.693878	290	0.489655	574	0.383275	10 port_stephens
ps18	-32.719	152.1287	1.4	53	0.716981	310	0.309677	464	0.349138	10 port_stephens
ps19	-32.7182	152.1268	1.5	69	1.00E-05	429	0.344988	576	0.364583	14.14214 port_stephens
ps2	-32.7175	152.123	1.8	48	0.708333	275	0.48	498	0.405622	20 port_stephens
ps3	-32.7179	152.1275	4.1	36	0.777778	393	0.3257	537	0.357542	0 port_stephens
ps6	-32.7177	152.1208	1	8	1.75	151	0.516556	299	0.481605	-20 port_stephens
ps7	-32.718	152.1291	5.6	18	1.111111	295	0.305085	451	0.341463	10 port_stephens
ps9	-32.7175	152.124	4	32	0.875	290	0.475862	602	0.378738	0 port_stephens
sgb1	-35.1466	150.6296	1.5	42	1.095238	469	0.788913	768	0.760417	0 s_g_basin
sgb10	-35.1465	150.6294	1.7	31	1.225806	455	0.795604	775	0.75871	0 s_g_basin
sgb12	-35.1467	150.6286	1.2	41	0.878049	403	0.848635	782	0.7289	0 s_g_basin
sgb13	-35.1465	150.6284	2.5	19	1.157895	384	0.84375	779	0.744544	10 s_g_basin
sgb15	-35.1464	150.6295	1.6	13	2.153846	452	0.792035	774	0.75969	20 s_g_basin
sgb16	-35.1465	150.6288	1.8	25	1.36	411	0.856448	788	0.728426	10 s_g_basin
sgb17	-35.1465	150.6303	1.5	37	0.810811	479	0.776618	787	0.752224	0 s_g_basin
sgb18	-35.1465	150.6291	2.1	16	1.625	423	0.832151	783	0.738186	10 s_g_basin
sgb2	-35.1461	150.6306	3.7	12	1.666667	494	0.684211	800	0.7375	-28.2843 s_g_basin
sgb3	-35.1466	150.6283	2.6	27	1.111111	380	0.836842	775	0.740645	0 s_g_basin
sgb5	-35.1466	150.6301	1.5	50	0.84	471	0.789809	775	0.753548	0 s_g_basin
sgb6	-35.1465	150.6298	1.5	37	1.189189	470	0.782979	774	0.757106	0 s_g_basin
sgb7	-35.1467	150.6292	1.5	36	1	435	0.818391	778	0.742931	10 s_g_basin
sgb8	-35.1462	150.631	2.2	30	1	501	0.654691	799	0.740926	0 s_g_basin
sgb9	-35.1463	150.6299	2.3	21	1.714286	466	0.7897	780	0.751282	14.14214 s_g_basin

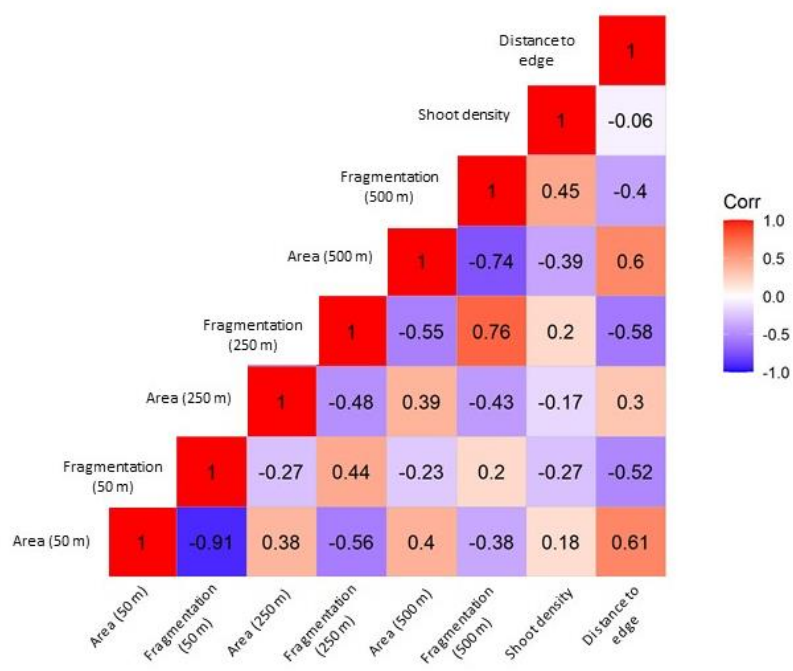
**Table S3.** List of fish species observed in the videos, including species functional traits (feeding information).

<b>Family</b>	<b>Genus</b>	<b>Species</b>	<b>Feeding information</b>	<b>Source</b>
Ambassidae	<i>Ambassis</i>	sp	Carnivore	FishBase
Labridae	<i>Thalassoma</i>	<i>amblycephalum</i>	Planktivore	FishBase
Mugilidae	<i>Liza</i>	<i>argentea</i>	Omnivore	DPI - Fisheries
Sparidae	<i>Chrysophrys</i>	<i>auratus</i>	Carnivore	FishBase
Sparidae	<i>Acanthopagrus</i>	<i>australis</i>	Carnivore	FishBase
Monacanthidae	<i>Nelussetta</i>	<i>ayraud</i>	Carnivore	FishBase
Labridae	<i>Neodax</i>	<i>balteatus</i>	Carnivore	Fishes of Australia
Clupeidae	<i>Herklotichthys</i>	<i>castelnaui</i>	Carnivore	FishBase
Monacanthidae	<i>Monacanthus</i>	<i>chinensis</i>	Omnivore	FishBase
Sillaginidae	<i>Sillago</i>	<i>ciliata</i>	Carnivore	FishBase
Perchichthyadae	<i>Perclates</i>	<i>colonorum</i>	Carnivore	FishBase
Trygonorrhinae	<i>Trygonorrhina</i>	<i>fasciata</i>	Carnivore	Fishes of Australia
Dasyatidae	<i>Hemitrygon</i>	<i>fluviorum</i>	Carnivore	FishBase
Monacanthidae	<i>Meuschenia</i>	<i>freycineti</i>	Omnivore	Truong et al. 2017 [124]
Platycephalidae	<i>Platycephalus</i>	<i>fuscus</i>	Carnivore	FishBase
Belonidae	<i>Tylosurus</i>	<i>gavialoides</i>	Carnivore	Manjakasy et al. 2009 [125]
Carangidae	<i>Pseudocaranx</i>	<i>georgianus</i>	Carnivore	Fishes of Australia
Tetraodontidae	<i>Tetractenos</i>	<i>glaber</i>	Omnivore	FishBase
Monacanthidae	<i>Scobinichthys</i>	<i>granulatus</i>	Omnivore	FishBase
Labridae	<i>Notolabrus</i>	<i>gymnogenis</i>	Carnivore	Fishes of Australia
Monacanthidae	<i>Brachaluteres</i>	<i>jacksonianus</i>	Omnivore	Truong et al. 2017 [124]
Paralichthyidae	<i>Pseudorhombus</i>	<i>jenynsii</i>	Carnivore	FishBase
Dinolestidae	<i>Dinolestes</i>	<i>lewini</i>	Carnivore	Truong et al. 2017 [124]
Apogonidae	<i>Ostorhinchus</i>	<i>limenus</i>	Carnivore	<a href="https://www.reeflex.net">https://www.reeflex.net</a>
Mullidae	<i>Upeneichthys</i>	<i>lineatus</i>	Carnivore	FishBase
Kyphosidae	<i>Scorpiis</i>	<i>lineolata</i>	Omnivore	H. Schilling, unpublished data
Blennidae	<i>Petroscirtes</i>	<i>lupus</i>	Carnivore	Burchmore et al. 1984 [46]
Plotosidae	<i>Cnidoglanis</i>	<i>macrocephalous</i>	Omnivore	FishBase
Scatophagidae	<i>Selenotoca</i>	<i>multifasciata</i>	Omnivore	Fishes of Australia
Rhinopteridae	<i>Rhinoptera</i>	<i>neglecta</i>	Planktivore	Australian Museum
Carangidae	<i>Trachurus</i>	<i>novaezealandiae</i>	Planktivore	H. Schilling, unpublished data
Sphyraenidae	<i>Sphyraena</i>	<i>obtusata</i>	Carnivore	FishBase
Diodontidae	<i>Dicotylichthys</i>	<i>punctulatus</i>	Carnivore	Australian Museum
Anguillidae	<i>Hyporhamphus</i>	<i>reinhardtii</i>	Omnivore	FishBase
Pomatomidae	<i>Pomatomus</i>	<i>saltatrix</i>	Carnivore	FishBase

Sparidae	<i>Rhabdosargus</i>	<i>sarba</i>	Carnivore	FishBase
Labridae	<i>Haletta</i>	<i>semifasciata</i>	Omnivore	FishBase
Pomacentridae	<i>Abudefduf</i>	<i>sexfasciatus</i>	Omnivore	FishBase
Terapontidae	<i>Pelates</i>	<i>sexlineatus</i>	Carnivore	FishBase
Monacanthidae	<i>Acanthaluteres</i>	<i>spilomelanurus</i>	Omnivore	FishBase
Mullidae	<i>Parupeneus</i>	<i>spilurus</i>	Carnivore	Truong et al. 2017 [124]
Gobiidae	<i>Gobiopterus</i>	sp	Omnivore	FishBase
Scorpididae	<i>Atypichthys</i>	<i>strigatus</i>	Planktivore	Champion et al. 2015 [126]
Gerreidae	<i>Gerres</i>	<i>subfasciatus</i>	Carnivore	FishBase
Urolophidae	<i>Trygonoptera</i>	<i>testacea</i>	Carnivore	FishBase
Monacanthidae	<i>Meuschenia</i>	<i>trachylepis</i>	Omnivore	Truong et al. 2017 [124]
Mullidae	<i>Upeneus</i>	<i>tragula</i>	Carnivore	FishBase
Girellidae	<i>Girella</i>	<i>tricuspidata</i>	Herbivore	FishBase
Arripidae	<i>Arripis</i>	<i>trutta</i>	Carnivore	FishBase
Monacanthidae	<i>Meuschenia</i>	<i>venusta</i>	Omnivore	Based on <i>Meuschenia</i> spp.
Labridae	<i>Achoerodus</i>	<i>viridis</i>	Carnivore	Gillanders 1995 [29]
Monacanthidae	<i>Acanthaluteres</i>	<i>vittiger</i>	Herbivore	FishBase



**Figure S1.** Example of (a) an artificial *Posidonia* unit in a seagrass patch and (b) in a bare area and (c) of a supra-canopy GoPro set up.



**Figure S2.** Correlation plots among variables: distance to patch edge, seagrass shoot density, area and level of fragmentation at 50 m, 250 m and 500 m of radius.