Ecography

ECOG-03551
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Supplementary material

Appendix 1

Table A1. L ocation, seascape characteristics and water quality of each of the 22 estuaries sampled. Estuaries are ordered to reflect their distribution from north to south across southeast Queensland. Seascape characteristics (i.e. hardened shore, mangrove area, mouth width and length) were calculated for the entire sampled section of each estuary; water quality variables are averages for this same reach.

Estuary	Latitude	Longitude	Hardened shore (%)	Mangrove area (km^2)	Mouth width (m)	Length (m)	Salinity (ppt)	Turbidity (NTU)	Chlorophyll-a (mg/L)
Noosa	26°22'S	153° 04'E	10.07	0.75	210	3785	35.52	1.02	0.33
Maroochy	26°38'S	153° 06'E	9.67	0.96	191	6667	35.63	1.74	0.95
Mooloolah	26°40'S	153° 08'E	51.05	0.32	102	7790	34.48	1.47	1.54
Bells	26°50'S	153° 06'E	4.15	0.38	160	6345	29.01	6.13	0.70
Westaways	26°53'S	153° 05'E	0.00	0.31	40	1230	31.33	14.72	0.25
Tripcony	26°58'S	153° 04'E	0.00	4.30	560	2480	34.52	5.21	1.83
Coochin	26°54'S	153° 04'E	0.14	1.47	161	2690	31.48	9.46	0.60
Caboolture	27° 09'S	153° 02'E	0.50	3.64	312	5440	33.47	3.82	0.64
Saltwater	27°14'S	153° 03'E	4.64	4.18	627	4034	35.38	6.93	1.21
Pine	27°16'S	153° 02'E	10.89	6.55	609	10378	31.31	6.36	1.86
Cabbagetree	27°20'S	153° 04'E	21.07	0.35	81	2769	34.88	4.51	0.87
Nundah	27°20'S	153° 04'E	0.37	1.68	130	2695	35.15	5.59	1.08
Brisbane	27°24'S	153° 09'E	86.21	2.69	608	15567	33.13	11.51	1.66
Tingalpa	27°28'S	153°11'E	0.43	1.11	215	3154	32.87	5.33	0.86
Logan	27°41'S	153°19'E	0.53	5.43	276	6651	31.84	15.12	1.87
Pimpama	27°48'S	153°22'E	21.30	5.02	152	8052	35.57	5.79	1.25
McCoys	27°49'S	153°22'E	0.00	0.80	89	3268	35.86	6.18	0.96
Coomera	27°52'S	153°23E	61.11	3.42	373	14158	34.04	3.68	1.24
Coombabah	27°53'S	153°22E	0.00	2.17	345	1040	32.17	5.58	1.35
Nerang	27°58'S	153°25'E	98.26	0.00	214	10357	33.94	1.74	0.70
Tallebudgera	28° 05'S	153°27'E	21.18	0.28	171	4188	34.64	2.41	0.47
Currumbin	28° 07'S	153°29'E	28.85	0.26	142	5725	33.63	6.90	0.69

Table A2 . Scavenger fish species and their rates of carrion consumption in estuaries of southeast Queensland (Australia). Scavenger abundance was indexed by the maximum number of individuals recorded at one time in each one hour BRUVS deployment (Max N). The frequency of occurrence (FoC) of scavengers was indexed as the proportion of BRUVS deployments in which each species was recorded. The rate of carrion consumption was indexed as both the total number of bites taken (i.e. pieces of carrion taken and consumed) and the proportion of bait consumed in each one hour BRUVS deployment.

Common name	Scientific name	Mean Max N (SE)	FoC	Mean bite rate (SE)	Carrion consumed (%)
Yellowfin bream	*Acanthopagrus australis*	7.4 (0.4)	0.84	579.8 (33.6)	61.3
Banded toadfish	*Marilyna pleurostricta*	0.6 (0.1)	0.26	237.9 (14.2)	16.8
Common toadfish	*Tetractenos hamiltoni*	0.5 (0.1)	0.29	165.3 (12.0)	7.8
Cresent perch	*Tarapon jarbua*	0.2 (0.1)	0.05	166.3 (21.2)	4.1
Weeping toadfish	*Torquigener pleurogramma*	0.3 (0.1)	0.10	79.6 (7.6)	2.6
Tarwhine	*Rhabdosargus sarba*	0.2 (0.1)	0.10	37.6 (3.3)	1.8
Smooth toadfish	*Tetractenos glaber*	0.1 (0.1)	0.02	36.5 (6.3)	1.6
Six-lined trumpeter	*Pelates sexlineatus*	0.2 (0.1)	0.06	19.7 (2.5)	0.1
Trumpeter whiting	*Silago maculata*	0.2 (0.1)	0.10	12.4 (1.7)	0.1
Sand whiting	*Silago ciliata*	0.2 (0.1)	0.10	9.2 (1.0)	<0.1
Goldenlined whiting	*Silago analis*	0.2 (0.1)	0.13	7.5 (0.9)	<0.1
Blue catfish	*Neoarius graeffei*	0.2 (0.1_	0.13	4.8 (0.7)	<0.1
Estuary ray	*Dasyatis fluviorum*	0.1 (0.1)	0.10	4.8 (0.6)	<0.1
Estuary perch	*Ambassis marianus*	7.2 (1.3)	0.27	5.8 (1.0)	<0.1
Moses perch	*Lutjanus russelli*	0.1 (0.1)	0.02	1.5 (0.3)	<0.1
Green toadfish	*Lagocephalus lunaris*	0.0 (0.0)	0.00	0.8 (0.2)	<0.1
Longfinned eel	*Anguilla reinhardtii*	0.1 (0.0)	0.01	0.5 (0.1)	<0.1
Common silverbiddy	*Gerres subfaciata*	0.7 (0.2)	0.23	0.4 (0.1)	<0.1
Narrow-lined puffer	*Arothron malinensis*	0.1 (0.1)	0.01	0.2 (0.1)	<0.1
Reticulate whipray	*Himantura uarnak*	0.0 (0.0)	0.00	0.2 (0.1)	<0.1
Dusky flathead	*Platycephalus fuscus*	0.1 (0.1)	0.09	0.2 (0.1)	<0.1
Dusky rabbitfish	*Siganus fusescens*	0.1 (0.1)	0.01	0.2 (0.1)	<0.1
Striped catfish	*Plotosus lineatus*	0.5 (0.5)	0.00	0.1 (0.1)	<0.1

Table A3 . Summary of importance values from best-fit general additive models (GAMs) relating the distribution of total carrion consumption (i.e. by all species combined) to environmental variables. Nesting sites within estuaries did not alter model performance, as 'Site' was not included in best-fit models.

Environmental variables	Total consumption	
	Not nested	Nested
Hardened shore (%)	1.00	1.00
Mangroves (km^2)	0.74	0.74
Mouth width (m)	1.00	1.00
Salinity (psu)	1.00	1.00
Turbidity (NTU)	0.26	0.26
Chlorophyll-a	<0.01	<0.01
Latitude	1.00	1.00
Site (Estuary)		<0.01

Table A4 . Summary of importance values from best-fit general additive models (GAMs) relating the distribution of carrion consumption by dominant scavengers to environmental variables. Yellowfin bream (*Acanthopagrus australis*), banded toadfish (*Marilyna pleurosticta*) and common toadfish (*Tetractenos hamiltoni*) consumed >85% of experimentally-placed carrion. Nesting sites within estuaries did not alter model performance, as 'Site' was never included in best-fit models.

Environmental variables	Yellowfin bream		Banded toadfish		Common toadfish	
	Not nested	Nested	Not nested	Nested	Not nested	Nested
Hardened shore (%)	1.00	1.00	0.10	0.10	0.19	0.19
Mangroves (km^2)	0.43	0.43	1.00	1.00	1.00	1.00
Mouth width (m)	0.77	0.77	0.60	0.60	0.22	0.22
Salinity (psu)	0.44	0.44	0.30	0.30	0.96	0.96
Turbidity (NTU)	0.18	0.18	0.97	0.97	0.61	0.61
Chlorophyll-a	0.89	0.89	1.00	1.00	0.41	0.41
Site (Estuary)		<0.01		<0.01		<0.01

Table A5 . Summary of importance values from best-fit general additive models (GAMs) relating the distribution of dominant scavengers (i.e. yellowfin bream, banded toadfish and common toadfish) to environmental variables. Nesting sites within estuaries did not alter model performance, as 'Site' was never included in best-fit models.

Environmental variables	Yellowfin bream		Banded toadfish		Common toadfish	
	Not nested	Nested	Not nested	Nested	Not nested	Nested
Hardened shore (%)	1.00	1.00	0.09	0.09	<0.01	<0.01
Mangroves (km^2)	0.48	0.48	1.00	1.00	1.00	1.00
Mouth width (m)	1.00	1.00	0.12	0.12	1.00	1.00
Salinity (psu)	0.98	0.98	0.99	0.99	<0.01	<0.01
Turbidity (NTU)	<0.01	<0.01	0.89	0.89	1.00	1.00
Chlorophyll-a	0.04	0.04	0.63	0.63	1.00	1.00
Site (Estuary)		<0.01		<0.01		<0.01

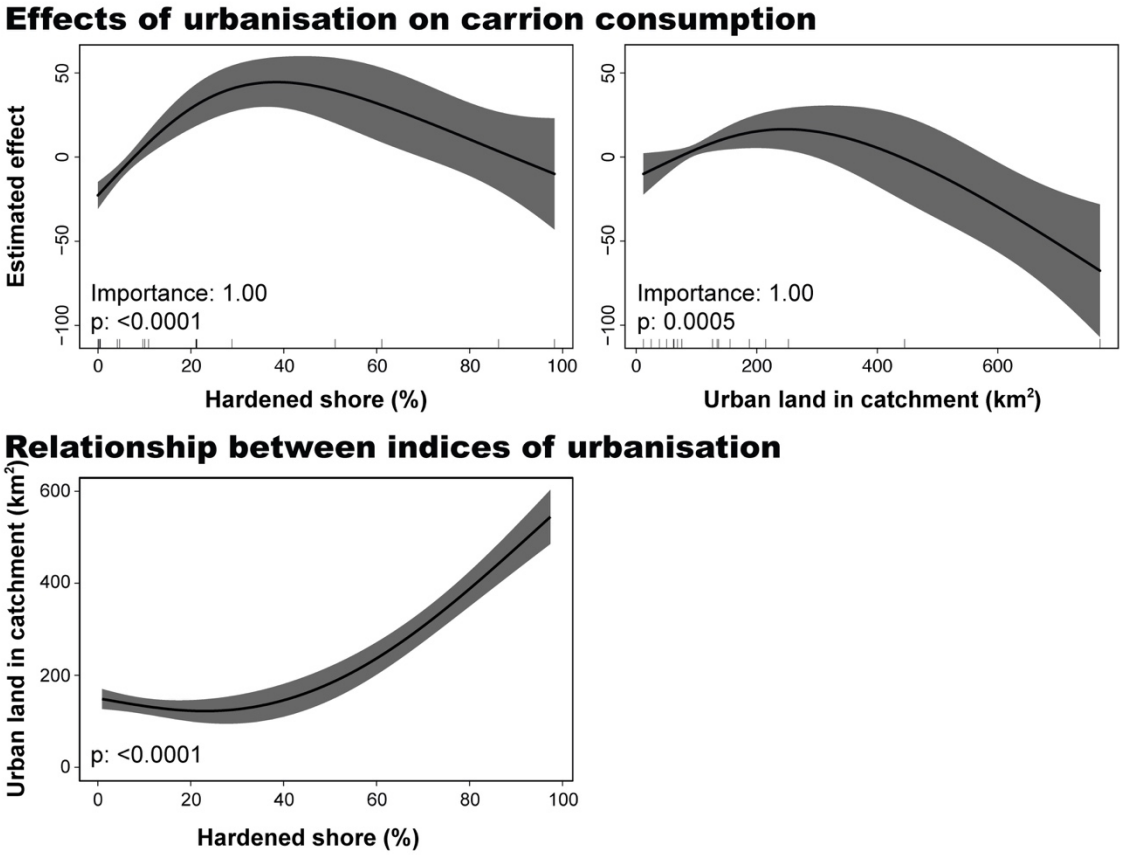

Fig. A1. General additive models (GAMs) illustrating: (1) effects of two different measures of urbanisation (i.e. the proportion of hardened shoreline in the estuary, and the area of urban land in the catchment) on carrion consumption; and (2) the strong correlation between these metrics. Shaded regions indicate 95% confidence intervals. Importance values indicate the relative contribution of each variable to GAMs models. Larger importance values indicate stronger correlation with carrion consumption; smaller values (i.e. < 0.60) have little or no effect.

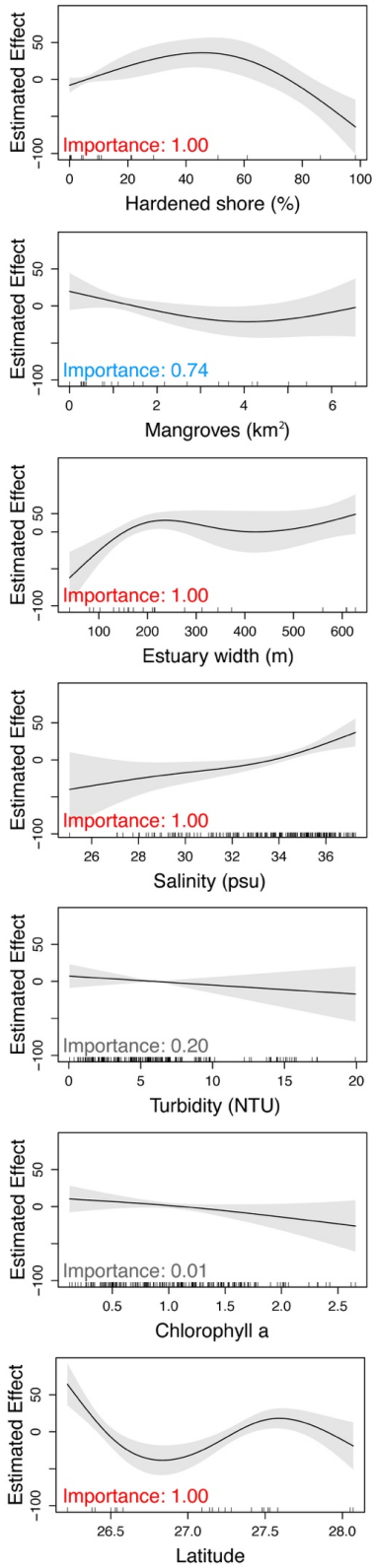

Fig. A2. General additive models (GAMs) relating the distribution of total carrion consumption (i.e. by all species combined) to environmental variables. Shaded regions indicate 95% confidence intervals. Importance values indicate the relative contribution of each variable to GAMs models. Larger importance values indicate stronger correlation with carrion consumption; smaller values (i.e. < 0.60) have little or no effect (grey: < 0.60; blue: 0.60-0.80; red: >0.80).

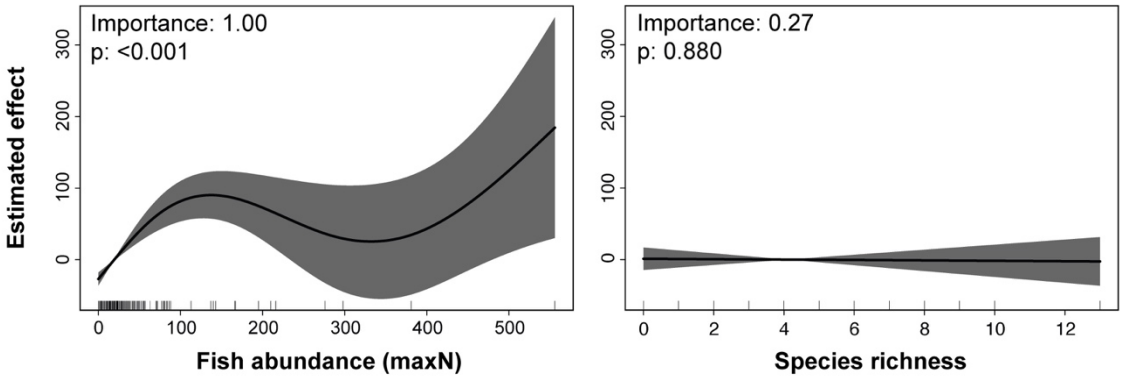

Fig. A3. General additive models (GAMs) relating the distribution of total carrion consumption (i.e. by all species combined) to fish abundance and species richness. Shaded regions indicate 95% confidence intervals. Importance values indicate the relative contribution of each variable to GAMs models. Larger importance values indicate stronger correlation with carrion consumption; smaller values (i.e. < 0.60) have little or no effect.

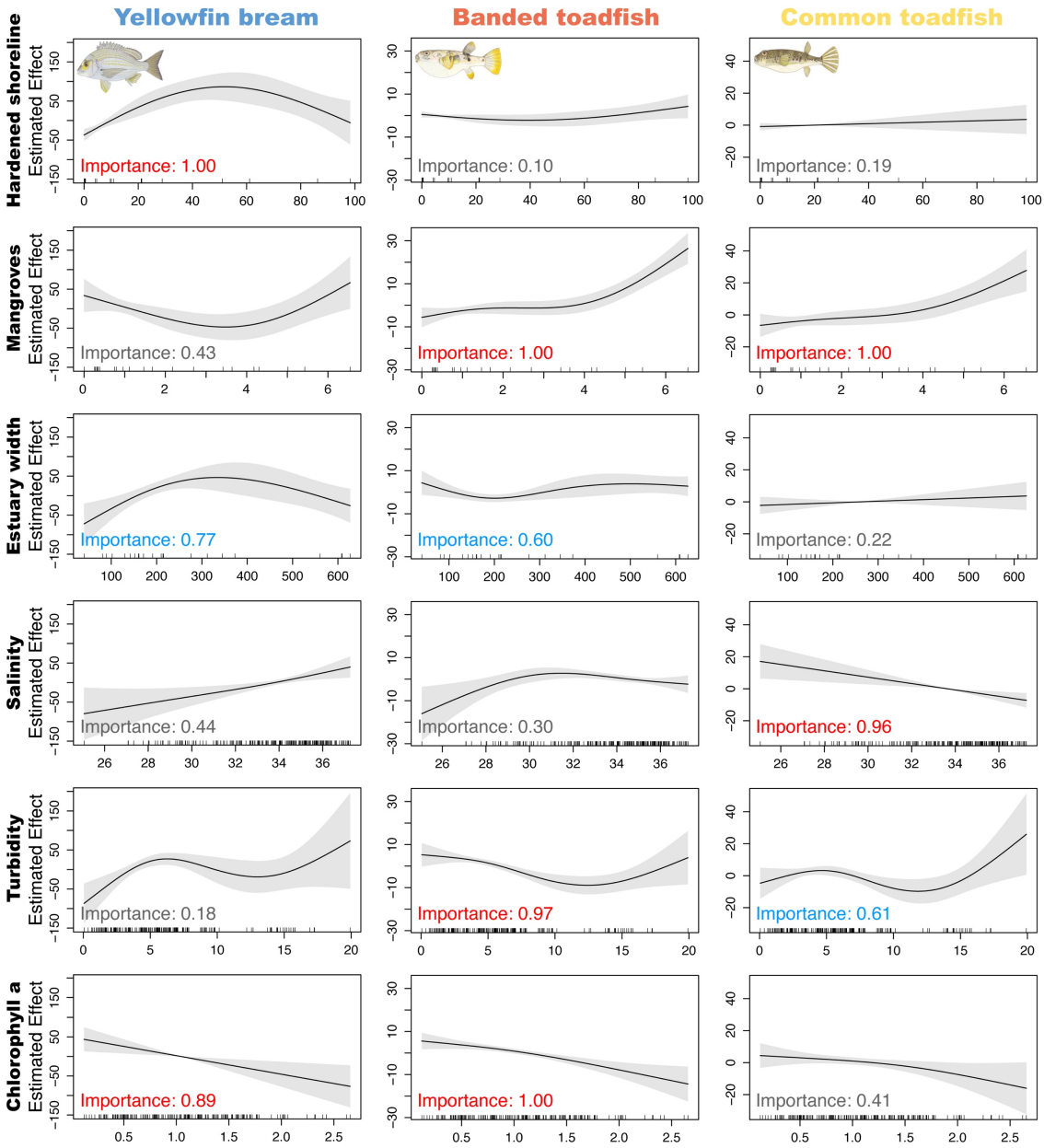

Fig. A4. General additive models (GAMs) relating the distribution of carrion consumption by dominant scavengers to environmental variables. Yellowfin bream (*Acanthopagrus australis*), banded toadfish (*Marilyna pleurosticta*) and common toadfish (*Tetractenos hamiltoni*) consumed >85% of experimentally-placed carrion. Shaded regions indicate 95% confidence intervals. Importance values indicate the relative contribution of each variable to GAMs models. Larger importance values indicate stronger correlation with carrion consumption; smaller values (i.e. < 0.60) have little or no effect (grey: < 0.60; blue: 0.60-0.80; red: >0.80).

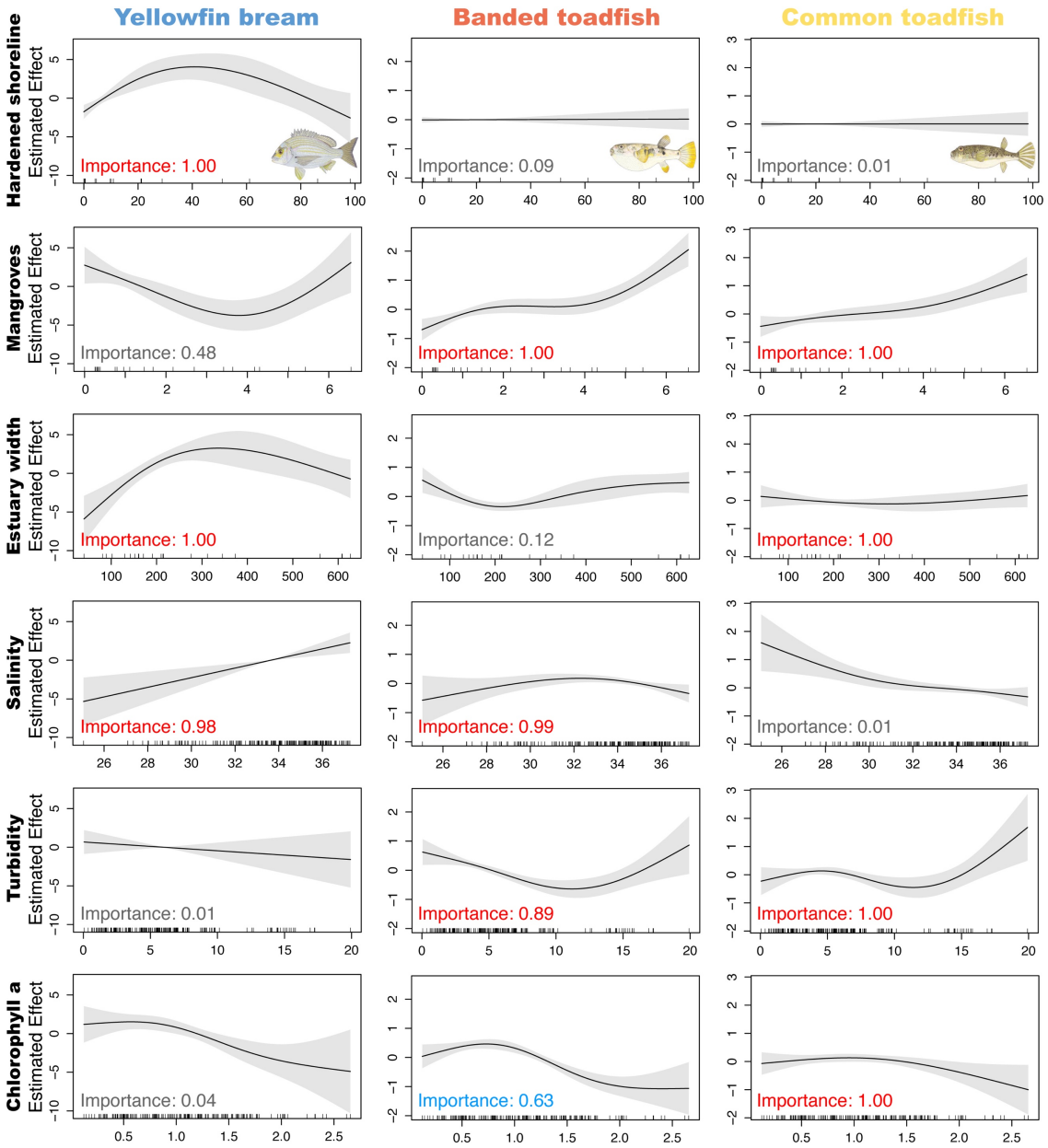

Fig. A5 . General additive models (GAMs) relating the distribution of dominant scavengers (i.e. yellowfin bream, banded toadfish and common toadfish) to environmental variables. Shaded regions indicate 95% confidence intervals. Importance values indicate the relative contribution of each variable to GAMs models. Larger importance values indicate stronger correlation with carrion consumption; smaller values (i.e. < 0.60) have little or no effect (grey: < 0.60; blue: 0.60-0.80; red: >0.80).