

Feeding ecology of two high-order predators from south-eastern Australia: the coastal broadnose and the deepwater sharpnose sevengill sharks

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Table A1. *Heptranchias perlo*. Dietary composition for small and large individuals. Mean percentage mass (%M), mean percentage number (%N), mean percentage frequency of occurrence (%FO), mean percentage index of relative importance (%IRI), $\pm 95\%$ confidence intervals, and comparison between %IRI and a point estimate of %IRI (%IRI_{PE}), expressed as percentage variability. Unid.: unidentifiable; n = 53 and 35 with prey for small and large *H. perlo*, respectively

Prey	M (%)	N (%)	FO (%)	IRI (%)	IRI vs. IRI _{PE} (%)
Small					
<i>Oplophorus novaezeelandie</i>	0.05 ± 0.13	1.06 ± 2.59	1.73 ± 3.72	0.08 ± 0.34	0
<i>Haliporoides sibogae</i>	0.07 ± 0.20	1.03 ± 2.50	1.83 ± 3.63	0.08 ± 0.41	4
Unid. Ommastrephidae	0.64 ± 1.34	2.14 ± 3.48	3.63 ± 5.47	0.40 ± 1.15	6
<i>Nototodarus gouldi</i>	8.76 ± 11.54	3.18 ± 4.11	5.45 ± 7.28	2.52 ± 4.94	2
<i>Todarodes filippovae</i>	2.12 ± 4.32	3.30 ± 5.45	3.72 ± 5.37	0.80 ± 2.17	13
<i>Todaropsis eblanae</i>	0.32 ± 0.78	1.04 ± 2.16	1.77 ± 3.68	0.09 ± 0.33	7
<i>Enoploteuthis galaxias</i>	0.99 ± 2.61	1.05 ± 2.71	1.91 ± 3.54	0.15 ± 0.54	9
<i>Narcine tasmaniensis</i>	1.31 ± 2.86	1.04 ± 2.76	1.87 ± 3.58	0.17 ± 0.73	13
Unid. Osteichthyes	3.74 ± 4.44	6.53 ± 6.11	10.66 ± 9.34	4.30 ± 6.60	4
<i>Paraulopus nigripinnis</i>	5.90 ± 11.83	1.02 ± 2.47	1.68 ± 3.78	0.42 ± 1.62	15
Unid. Myctophidae	0.33 ± 0.84	1.09 ± 2.61	1.82 ± 3.63	0.10 ± 0.44	8
Unid. Macrouridae	0.51 ± 1.10	1.02 ± 1.81	1.79 ± 3.67	0.10 ± 0.38	7
<i>Caelorinchus</i> spp.	0.19 ± 0.46	1.00 ± 2.16	1.78 ± 3.67	0.08 ± 0.38	9
<i>Caelorinchus</i> sp.1	0.53 ± 1.34	1.09 ± 2.58	1.87 ± 3.59	0.12 ± 0.50	14
<i>Caelorinchus</i> sp.3	3.89 ± 5.24	4.35 ± 4.54	7.35 ± 7.20	2.35 ± 3.84	6
<i>Lepidorhynchus denticulatus</i>	26.65 ± 15.06	15.96 ± 8.09	23.48 ± 11.06	37.63 ± 18.73	2
<i>Macruronus novaezeelandiae</i>	5.93 ± 12.91	1.04 ± 2.33	1.84 ± 3.62	0.51 ± 1.91	7
Unid. Trichiuridae	10.20 ± 11.15	8.58 ± 6.54	14.72 ± 8.97	10.62 ± 12.43	4
<i>Benthodesmus elongatus</i>	6.98 ± 15.16	1.08 ± 2.62	1.89 ± 3.56	0.61 ± 2.74	9
Unid. Acropomatidae	0.13 ± 0.31	4.26 ± 9.40	1.82 ± 3.63	0.33 ± 1.65	11
<i>Apogonops anomalus</i>	12.52 ± 9.54	28.28 ± 14.07	19.97 ± 10.99	30.65 ± 16.73	1
Unid. Gempylidae	7.11 ± 7.53	8.64 ± 7.21	12.60 ± 9.22	7.64 ± 8.55	3
<i>Lepidoperca</i> spp.	0.69 ± 1.54	1.11 ± 3.10	1.97 ± 3.49	0.13 ± 0.46	14
Large					
<i>Haliporoides sibogae</i>	0.48 ± 1.23	1.67 ± 4.39	2.93 ± 5.64	0.21 ± 0.85	14
<i>Octopus</i> spp.	2.04 ± 3.16	3.33 ± 5.15	5.75 ± 8.54	0.95 ± 2.16	1
<i>Nototodarus gouldi</i>	0.54 ± 1.24	3.22 ± 6.62	2.90 ± 5.67	0.33 ± 1.37	3
<i>Todaropsis eblanae</i>	0.01 ± 0.02	1.75 ± 3.81	2.87 ± 5.70	0.15 ± 0.72	2
<i>Paraulopus nigripinnis</i>	12.22 ± 14.87	6.67 ± 6.29	11.55 ± 11.30	6.66 ± 9.39	0
<i>Caelorinchus</i> sp.1	1.89 ± 3.50	3.26 ± 5.07	5.64 ± 8.65	0.90 ± 2.22	3
<i>Caelorinchus</i> sp.3	3.16 ± 4.85	5.14 ± 5.97	8.34 ± 8.80	2.16 ± 3.92	1
<i>Lepidorhynchus denticulatus</i>	12.49 ± 10.62	28.01 ± 10.98	40.15 ± 16.99	49.44 ± 18.30	1
<i>Genypterus blacodes</i>	1.94 ± 4.76	1.65 ± 4.01	2.95 ± 5.62	0.34 ± 1.39	12
<i>Lepidotrigla modesta</i>	2.24 ± 5.47	1.71 ± 3.77	2.85 ± 5.72	0.34 ± 1.28	0
Unid. Trichiuridae	18.09 ± 24.58	10.22 ± 11.21	14.51 ± 11.21	12.60 ± 18.29	0
<i>Benthodesmus elongatus</i>	7.58 ± 16.95	1.67 ± 3.89	2.92 ± 5.65	0.84 ± 3.53	2
Unid. Centrolophidae	10.64 ± 23.32	1.68 ± 3.58	2.80 ± 5.77	1.12 ± 5.14	3
<i>Apogonops anomalus</i>	4.57 ± 8.22	13.18 ± 15.39	11.57 ± 11.29	6.36 ± 11.62	2
Unid. Gempylidae	13.59 ± 16.77	11.77 ± 9.98	19.68 ± 11.75	15.45 ± 19.07	2
<i>Rexea solandri</i>	7.00 ± 13.60	3.42 ± 5.68	5.62 ± 8.67	1.86 ± 4.84	2
<i>Ruvettus pretiosus</i>	1.52 ± 3.55	1.65 ± 3.80	2.68 ± 5.89	0.27 ± 1.15	1

Table A2. *Notorynchus cepedianus*. Dietary composition for small, medium and large individuals. Mean percentage mass (%M), mean percentage number (%N), mean percentage frequency of occurrence (%FO), and mean percentage index of relative importance (%IRI), $\pm 95\%$ confidence intervals, and comparison between %IRI and a point estimate of %IRI (%IRI_{PE}), expressed as percentage variability. Unid.: unidentifiable; ND: no data; n = 26, 71 and 13 with prey for small, medium and large *N. cepedianus*, respectively

Prey	M (%)	N (%)	FO (%)	IRI (%)	IRI vs. IRI _{PE} (%)
Small					
Unid. Animalia	0.45 \pm 1.33	3.18 \pm 7.53	4.01 \pm 7.99	1.14 \pm 5.28	13
<i>Jasus edwardsii novaehollandiae</i>	0.58 \pm 1.46	3.26 \pm 7.09	3.89 \pm 8.11	1.19 \pm 5.68	14
Unid. Cephalopoda	3.61 \pm 6.60	6.20 \pm 9.93	7.87 \pm 12.13	5.75 \pm 13.64	1
Unid. Ommastrephidae	8.54 \pm 21.63	6.14 \pm 10.53	7.75 \pm 12.25	8.15 \pm 20.18	2
<i>Nototodarus gouldi</i>	1.77 \pm 4.81	3.19 \pm 6.82	3.98 \pm 8.02	1.47 \pm 6.11	8
<i>Todarodes filippovae</i>	0.04 \pm 0.11	3.08 \pm 7.27	4.01 \pm 7.99	0.97 \pm 4.83	6
Unid. Chondrichthyes	3.37 \pm 8.54	3.42 \pm 7.69	4.02 \pm 7.98	2.06 \pm 8.64	16
<i>Pristiophorus nudipinnis</i>	3.66 \pm 9.78	6.43 \pm 13.57	4.11 \pm 7.89	3.16 \pm 12.20	13
<i>Mustelus antarcticus</i>	15.33 \pm 23.45	8.96 \pm 13.26	7.84 \pm 12.16	13.35 \pm 29.09	15
<i>Parascyllium ferrugineum</i>	4.20 \pm 11.91	2.99 \pm 7.35	4.11 \pm 7.89	2.31 \pm 9.45	15
<i>Urolophus cruciatus</i>	4.93 \pm 5.74	6.08 \pm 8.63	7.83 \pm 12.17	6.28 \pm 13.29	5
<i>Urolophus paucimaculatus</i>	13.86 \pm 26.94	6.34 \pm 13.02	4.11 \pm 7.89	6.36 \pm 24.24	14
<i>Myliobatis australis</i>	11.16 \pm 21.68	6.19 \pm 9.44	7.89 \pm 12.11	9.75 \pm 24.23	4
<i>Callorhynchus milii</i>	6.18 \pm 15.07	3.31 \pm 7.80	4.00 \pm 8.00	2.91 \pm 11.66	9
Unid. Osteichthyes	7.83 \pm 13.33	12.56 \pm 11.68	15.99 \pm 16.01	23.19 \pm 27.47	3
Unid. Triglidae	3.48 \pm 5.85	2.95 \pm 5.38	3.83 \pm 8.17	1.69 \pm 5.31	19
Unid. Gempylidae	7.61 \pm 19.63	3.14 \pm 7.21	4.00 \pm 8.10	3.18 \pm 13.14	6
Unid. Cheilodactylidae	0.29 \pm 0.76	3.20 \pm 7.91	3.97 \pm 8.03	1.00 \pm 4.93	2
Unid. Sillaginidae	1.43 \pm 2.86	6.28 \pm 10.96	8.03 \pm 11.97	4.64 \pm 11.60	7
<i>Arctocephalus</i> spp.	1.70 \pm 4.97	3.10 \pm 7.24	3.96 \pm 8.04	1.44 \pm 6.10	7
Medium					
<i>Jasus edwardsii novaehollandiae</i>	0.04 \pm 0.11	1.10 \pm 2.43	1.49 \pm 2.79	0.20 \pm 0.91	4
Unid. Aegidae	<0.01 \pm 0.00	1.03 \pm 2.34	1.46 \pm 2.83	0.20 \pm 0.93	4
<i>Sepioteuthis australis</i>	0.22 \pm 0.35	2.05 \pm 2.90	2.85 \pm 4.29	0.79 \pm 1.78	5
Unid. Ommastrephidae	6.72 \pm 11.26	5.46 \pm 4.66	7.16 \pm 7.12	10.61 \pm 15.70	0
<i>Nototodarus gouldi</i>	0.07 \pm 0.19	1.03 \pm 2.42	1.46 \pm 2.83	0.19 \pm 0.94	6
<i>Todarodes filippovae</i>	0.59 \pm 1.50	1.07 \pm 2.46	1.48 \pm 2.81	0.30 \pm 1.37	5
<i>Todaropsis eblanae</i>	0.95 \pm 1.36	3.25 \pm 3.90	4.45 \pm 5.55	2.32 \pm 4.76	6
<i>Ommastrephes bartramii</i>	0.08 \pm 0.20	1.04 \pm 2.15	1.51 \pm 2.77	0.22 \pm 0.89	7
Unid. Chondrichthyes	1.97 \pm 2.56	6.48 \pm 7.38	7.14 \pm 7.15	7.46 \pm 11.68	2
<i>Squatina</i> spp.	3.18 \pm 6.07	3.19 \pm 4.42	4.34 \pm 5.66	3.39 \pm 6.56	2
<i>Squatina australis</i>	2.31 \pm 4.21	2.05 \pm 2.90	2.85 \pm 4.29	1.49 \pm 3.44	4
<i>Pristiophorus nudipinnis</i>	0.51 \pm 1.19	2.12 \pm 3.32	2.79 \pm 4.35	0.91 \pm 2.70	1
<i>Squalus megalops</i>	3.58 \pm 6.21	2.10 \pm 2.90	2.99 \pm 4.15	2.17 \pm 5.60	8
Unid. Triakidae	0.08 \pm 0.20	1.11 \pm 2.30	1.37 \pm 2.92	0.21 \pm 0.98	5
<i>Mustelus antarcticus</i>	1.38 \pm 2.31	2.25 \pm 3.37	2.91 \pm 4.23	1.29 \pm 3.06	6
Unid. Rajiformes	2.06 \pm 3.66	2.17 \pm 3.58	2.91 \pm 4.24	1.53 \pm 3.89	5
Unid. Urolophidae	0.83 \pm 2.03	2.12 \pm 3.43	2.91 \pm 4.24	1.07 \pm 3.15	3
<i>Urolophus</i> spp.	2.69 \pm 4.37	3.25 \pm 4.07	4.22 \pm 5.78	3.01 \pm 5.59	3
<i>Urolophus cruciatus</i>	1.35 \pm 2.07	3.26 \pm 3.60	4.22 \pm 5.78	2.38 \pm 4.72	0
<i>Urolophus paucimaculatus</i>	2.36 \pm 4.94	1.06 \pm 2.35	1.48 \pm 2.81	0.63 \pm 2.20	5
<i>Myliobatis australis</i>	14.24 \pm 14.11	6.43 \pm 6.36	6.98 \pm 5.88	17.17 \pm 19.92	4
<i>Callorhynchus milii</i>	14.21 \pm 16.16	5.37 \pm 6.20	5.69 \pm 5.74	13.31 \pm 18.16	4
Unid. Osteichthyes	1.40 \pm 1.52	7.86 \pm 5.82	9.95 \pm 7.20	11.21 \pm 11.91	3
<i>Macroramphosus scolopax</i>	0.29 \pm 0.74	3.13 \pm 6.45	1.51 \pm 2.77	0.66 \pm 2.72	7
Unid. Perciformes	0.38 \pm 0.96	1.10 \pm 2.87	1.51 \pm 2.78	0.27 \pm 1.02	9
Unid. Centrolophidae	6.02 \pm 7.87	3.20 \pm 3.94	4.23 \pm 4.34	4.80 \pm 8.20	1
<i>Rexea solandri</i>	1.45 \pm 3.82	1.10 \pm 2.47	1.43 \pm 2.86	0.46 \pm 2.10	7
<i>Thyrsites atun</i>	0.58 \pm 1.52	1.08 \pm 2.45	1.35 \pm 2.94	0.29 \pm 1.14	1
<i>Aplodactylus arctidens</i>	11.27 \pm 22.22	1.04 \pm 2.41	1.43 \pm 2.86	2.26 \pm 9.94	3
Unid. Cheilodactylidae	0.91 \pm 1.75	2.19 \pm 3.56	2.76 \pm 4.38	1.09 \pm 2.99	3
<i>Nemadactylus macropterus</i>	3.52 \pm 8.76	1.15 \pm 2.34	1.37 \pm 2.92	0.77 \pm 2.96	2
<i>Nemadactylus valenciennesi</i>	0.47 \pm 1.11	1.10 \pm 2.52	1.43 \pm 2.85	0.28 \pm 1.18	3
Unid. Sillaginidae	0.04 \pm 0.10	1.08 \pm 2.73	1.40 \pm 2.88	0.21 \pm 1.03	9
<i>Sillago flindersi</i>	1.45 \pm 3.51	3.02 \pm 6.35	1.40 \pm 2.89	0.79 \pm 3.11	4
<i>Chrysophrys auratus</i>	3.50 \pm 8.60	1.02 \pm 2.39	1.39 \pm 2.90	0.81 \pm 3.07	4

Table A2 (continued)

Prey	M %	N %	FO %	IR%	IRI vs. IRI _{PE} %
Medium					
Unid. Serranidae	1.08 ± 2.60	1.04 ± 2.44	1.47 ± 2.82	0.40 ± 1.63	5
<i>Parazanclostius hutchinsi</i>	1.45 ± 3.33	1.08 ± 2.49	1.45 ± 4.27	0.48 ± 2.01	10
<i>Arripis truttacea</i>	0.76 ± 2.03	1.12 ± 2.49	1.41 ± 2.88	0.33 ± 1.20	4
<i>Trachurus</i> spp.	1.42 ± 3.55	1.07 ± 2.54	1.37 ± 2.91	0.46 ± 2.02	8
<i>Trachurus declivis</i>	0.98 ± 1.78	2.11 ± 3.26	2.81 ± 4.33	1.10 ± 2.78	2
Unid. Gobiidae	0.67 ± 1.83	1.10 ± 2.56	1.42 ± 2.87	0.30 ± 1.15	4
Unid. Otariidae	1.03 ± 2.55	1.03 ± 2.46	1.39 ± 2.89	0.35 ± 1.39	4
<i>Arctocephalus</i> spp.	1.90 ± 4.28	2.18 ± 3.77	2.89 ± 4.25	1.46 ± 3.75	5
Large					
<i>Nototodarus gouldi</i>	0.06 ± 0.12	4.01 ± 8.00	7.52 ± 15.56	0.93 ± 3.88	16
<i>Squatina</i> spp.	0.96 ± 3.17	4.33 ± 9.96	7.75 ± 15.32	1.65 ± 6.95	25
<i>Notorynchus cepedianus</i>	11.09 ± 20.87	4.33 ± 9.31	7.84 ± 15.24	4.56 ± 18.21	13
<i>Mustelus antarcticus</i>	39.65 ± 26.09	16.31 ± 13.32	31.14 ± 30.40	56.47 ± 26.33	6
<i>Cephaloscyllium laticeps</i>	6.83 ± 16.45	4.26 ± 9.37	7.46 ± 15.62	3.09 ± 11.32	8
<i>Parascyllium ferrugineum</i>	3.79 ± 8.58	3.81 ± 7.73	7.79 ± 15.28	1.90 ± 6.29	10
Unid. Rajiformes	1.70 ± 4.89	4.11 ± 9.52	7.38 ± 15.69	1.66 ± 7.28	14
Unid. Rajidae	3.00 ± 6.42	4.08 ± 9.56	7.88 ± 15.20	2.11 ± 7.93	14
<i>Okamejei cerva</i>	6.52 ± 12.65	4.01 ± 8.00	7.52 ± 15.56	2.41 ± 8.32	18
<i>Myliobatis australis</i>	2.00 ± 4.82	4.26 ± 9.37	7.46 ± 15.62	1.73 ± 6.97	8
<i>Callorhynchus milii</i>	<0.01 ± 0.00	4.14 ± 8.91	7.81 ± 15.27	1.31 ± 6.82	21
Unid. Osteichthyes	6.81 ± 11.17	8.71 ± 14.02	15.37 ± 23.09	8.99 ± 20.18	14
Unid. Centrolophidae	0.97 ± 2.78	4.11 ± 9.52	7.38 ± 15.69	1.45 ± 7.00	12
Unid. Gempylidae	0.56 ± 1.61	4.45 ± 10.55	7.98 ± 15.09	1.58 ± 7.10	30
<i>Cheilodactylus spectabilis</i>	3.39 ± 7.68	4.36 ± 9.27	7.95 ± 15.13	1.99 ± 7.66	6
Unid. Sillaginidae	1.58 ± 4.15	8.68 ± 18.59	7.22 ± 15.85	2.70 ± 11.84	7
Unid. Pentacerotidae	0.96 ± 2.17	3.81 ± 7.73	7.79 ± 15.28	1.20 ± 4.11	11
Unid. Otariidae	10.11 ± 21.63	4.08 ± 9.56	7.88 ± 15.20	4.28 ± 16.30	17
<i>Arctocephalus forsteri</i>	ND	4.14 ± 8.91	7.81 ± 15.27	ND	ND