

Figure 18. Bustard Head Region 2002 (a) five most abundant species; (b) average similarity value and species contributing to the upper 50% (catch rate data); (c) average similarity value and species contributing to the upper 10% (presence/absence data).

Bustard Head Region dissimilarity summaries

Bustard Head Region 2000

Moderate dissimilarity (~60%) was observed between the sub-regions of 2000 (BH and BH2000). Two species identified in the similarity data, *Portunus rubromarginatus* and *Pristotis jerdoni*, contributed to the dissimilarity, but no significant difference was detected for either species between sub-regions in Bustard Head in 2000. *Pseudomancanthus peroni*, *Chaetodermis penicilligera* and *Pentapodus paradiseus* were all significantly more abundant in the closure. *Trachinocephalus myops* (also recognised in similarity data in BH2000) made an important contribution to the observed dissimilarity for both data types in the non-closure area (Table 7).

Bustard Head Region 2002

Moderate dissimilarity (~55%) was observed between the non-closure samples (BH2002) and the closure samples (BHB, BHC, BHD) of 2002 (Table 8, Table 9 and Table 10). *Saurida undosquamis* and *Upeneus asymmetricus* were more abundant in all closure areas compared with non-closure areas. *Nemipterus theodorei* was a significant cause of dissimilarity within closures BHB and BHC. *Pentapodus nagasakiensis* was significantly more abundant in the non-closure areas (BH2002) compared with all closures (BHB, BHC, BHD).

Bustard Head Closures 2002

Low dissimilarity (~45%) was observed between the Bustard Head Closures B and C (BHB, BHC) in 2002. *Paraperca nebulosa* contributed to dissimilarity for both data types and was significantly more abundant in Closure C than B. *Torquigener pallimaculatus* and *Sepia plangon* also contributed to dissimilarity (abundance data), consistent with the similarity data, but no significant difference between the sub-regions was detected. Moderate dissimilarity (~50%) between Closure D and the other closures (B and C) of Bustard Head was observed. Significantly more *Pentapodus nagasakiensis* and *Upeneus asymmetricus* were detected in the D closure than the others and accounted for an important amount of dissimilarity for both data types. Significantly more *Apistus carinatus* and *Nemipterus theodorei* were present in Closures B and C than in Closure D, accounting for further dissimilarity (abundance data). The significantly lower abundance of *Gymnocranium audleyi* in Closures B and C than in Closure D also accounted for some dissimilarity (abundance data) (Table 11, Table 12 and Table 13).

Bustard Head Region 2000 and 2002

The species recognised as important contributors to sample similarity in Bustard Head in 2000 and 2002 also contributed to the detected dissimilarity between years. *Saurida undosquamis* and *Torquigener pallimaculatus* were significant contributors to dissimilarity, being more abundant in 2000. *Pristotis jerdoni*, *Lenthrinus genivittatus*, *Pentapodus nagasakiensis*, *Inimicus caledonicus*, *Gymnocranium audleyi*, *Metapenaeopsis palmensis*, *Ambiserrula jugosa* and *Inegocia japonica* were all significantly more abundant in 2002 than in 2000 (Table 14).

(a)

Groups BH2000 & BH

Average dissimilarity = 63.42

Species	BH2000 Av.Abund.	BH Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Upeneus asymmetricus</i>	0.050	0.230	2.84	0.87	4.48	4.48
<i>Lethrinus genivittatus</i>	0.080	0.240	2.32	1.43	3.66	8.14
<i>Dendronephthya spp</i>	0.020	0.140	2.27	1.08	3.57	11.71*
<i>Pristotis jerdoni</i>	0.050	0.130	2.13	1.70	3.36	15.08
<i>Torquigener pallimaculatus</i>	0.250	0.040	1.72	0.70	2.71	17.78
<i>Trachinocephalus myops</i>	0.070	0.000	1.65	1.26	2.60	20.38*
<i>Nemipterus theodorei</i>	0.070	0.050	1.58	1.29	2.49	22.87
<i>Portunus rubromarginatus</i>	0.100	0.020	1.57	1.51	2.48	25.35
<i>Inimicus sinensis</i>	0.030	0.060	1.57	1.52	2.47	27.82
<i>Pentapodus paradiseus</i>	0.010	0.060	1.52	1.28	2.40	30.22*
<i>Chaetodermis penicilligera</i>	0.000	0.030	1.23	1.22	1.94	32.16*
<i>Inegocia japonica</i>	0.020	0.040	1.22	1.34	1.93	34.09
<i>Sponge</i>	0.050	0.010	1.22	0.77	1.93	36.02
<i>Pseudomonacanthus peroni</i>	0.000	0.040	1.20	0.97	1.90	37.91*
<i>Choerodon venustus</i>	0.010	0.050	1.10	0.74	1.73	39.64*
<i>Saurida undosquamis</i>	0.120	0.110	1.08	1.40	1.71	41.35
<i>Pentacaster sp.</i>	0.030	0.000	1.03	0.97	1.63	42.99
<i>Parapercis nebulosa</i>	0.030	0.020	1.03	1.43	1.62	44.60
<i>Annachlamys flabellata</i>	0.030	0.000	1.02	0.92	1.60	46.20
<i>Paramonacanthus otisensis</i>	0.040	0.060	0.99	1.36	1.57	47.77
<i>Siganus fuscescens</i>	0.030	0.010	0.94	0.87	1.48	49.26
<i>Metapenaeopsis palmensis</i>	0.040	0.010	0.92	1.27	1.45	50.71

(b)

Groups BH2000 & BH

Average dissimilarity = 55.75

Species	BH2000 Av.Abund.	BH Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Pseudomonacanthus peroni</i>	0.000	0.040	1.03	1.32	1.84	1.84*
<i>Callionymus japonicus</i>	0.010	0.010	0.97	1.23	1.73	3.57*
<i>Trachinocephalus myops</i>	0.070	0.000	0.94	1.19	1.68	5.25*
<i>Chaetodermis penicilligera</i>	0.000	0.030	0.91	1.30	1.64	6.89*
<i>Pentapodus paradiseus</i>	0.010	0.060	0.91	1.15	1.63	8.51*
<i>Sorsogona tuberculata</i>	0.000	0.010	0.85	1.14	1.52	10.04

Table 7. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in the Bustard Head Region and Bustard Head Closure in 2000.

* denotes a significant difference between groups detected.

(a)

Groups BH2002 & BHB

Average dissimilarity = 59.45

Species	BH2002 B	HB	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Saurida undosquamis</i>	0.080	0.530	3.95	1.06	6.65	6.65*
<i>Upeneus asymmetricus</i>	0.050	0.150	2.66	2.19	4.48	11.13*
<i>Pristotis jerdoni</i>	0.320	0.060	2.64	1.04	4.43	15.56
<i>Lethrinus genivittatus</i>	0.240	0.190	1.78	1.27	3.00	18.57
<i>Pentapodus nagasakiensis</i>	0.090	0.000	1.75	0.97	2.94	21.51*
<i>Nemipterus theodorei</i>	0.050	0.050	1.53	1.59	2.58	24.09*
<i>Portunus rubromarginatus</i>	0.100	0.030	1.42	1.31	2.38	26.47
<i>Gymnocranius audleyi</i>	0.070	0.010	1.37	0.97	2.30	28.77*
<i>Apistus carinatus</i>	0.010	0.040	1.34	1.99	2.26	31.03*
<i>Pseudorhombus spinosus</i>	0.010	0.040	1.26	1.36	2.13	33.16*
<i>Pentapodus paradiseus</i>	0.050	0.020	1.19	1.02	2.00	35.16
<i>Annachlamys flabellata</i>	0.030	0.020	1.04	1.16	1.76	36.92
<i>Acropora sp.</i>	0.070	0.000	1.02	0.57	1.71	38.63*
<i>Trachinocephalus myops</i>	0.030	0.020	0.99	1.33	1.66	40.29
<i>Inimicus caledonicus</i>	0.040	0.030	0.96	1.42	1.61	41.90
<i>Siganus fuscescens</i>	0.030	0.010	0.96	1.04	1.61	43.51
<i>Dasyatis kuhlii</i>	0.010	0.020	0.94	0.96	1.58	45.09*
<i>Paramonacanthus lowei</i>	0.010	0.020	0.91	1.29	1.53	46.62
<i>Callionymus japonicus</i>	0.010	0.020	0.90	1.48	1.52	48.14*
<i>Engyprosopon grandisquama</i>	0.010	0.040	0.87	1.56	1.47	49.61*
<i>Parapercis nebulosa</i>	0.020	0.000	0.78	1.31	1.32	50.93*

(b)

Groups BH2002 & BHB

Average dissimilarity = 49.37

Species	BH2002	BHB	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Sargassum sp.</i>	0.010	0.000	0.93	1.77	1.88	1.88*
<i>Lepidotrigla argus</i>	0.010	0.010	0.81	1.36	1.64	3.52
<i>Apistus carinatus</i>	0.010	0.040	0.80	1.26	1.61	5.13*
<i>Sorsogona tuberculata</i>	0.000	0.010	0.79	1.30	1.61	6.74*
<i>Onigocia spinosa</i>	0.010	0.000	0.79	1.35	1.59	8.33*
<i>Lobophora variegata</i>	0.020	0.000	0.78	1.36	1.58	9.92*
<i>Metapenaeopsis lamellata</i>	0.010	0.000	0.78	1.35	1.57	11.49*

Table 8. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in the Bustard Head Region and Bustard Head Closure B in 2002.

* denotes a significant difference between groups detected.

(a)

Groups BH2002 & BHC

Average dissimilarity = 56.07

Species	BH2002 Av.Abund.	BHC Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Pristotis jerdoni</i>	0.320	0.100	2.50	1.04	4.46	4.46
<i>Upeneus asymmetricus</i>	0.050	0.130	2.30	1.45	4.10	8.57*
<i>Saurida undosquamis</i>	0.080	0.090	1.94	1.45	3.46	12.03*
<i>Lethrinus genivittatus</i>	0.240	0.110	1.83	1.21	3.26	15.29
<i>Pentapodus nagasakiensis</i>	0.090	0.010	1.68	1.02	2.99	18.28*
<i>Nemipterus theodorei</i>	0.050	0.070	1.65	1.43	2.94	21.22*
<i>Gymnocranius audleyi</i>	0.070	0.030	1.46	1.12	2.60	23.82
<i>Pentapodus paradiseus</i>	0.050	0.020	1.31	1.00	2.34	26.16
<i>Portunus rubromarginatus</i>	0.100	0.050	1.16	1.14	2.07	28.23
<i>Trachinocephalus myops</i>	0.030	0.030	1.15	1.20	2.06	30.29
<i>Annachlamys flabellata</i>	0.030	0.030	1.13	1.19	2.02	32.30
<i>Acropora sp.</i>	0.070	0.000	1.00	0.57	1.78	34.08*
<i>Inimicus caledonicus</i>	0.040	0.040	0.97	1.36	1.74	35.82
<i>Apistus carinatus</i>	0.010	0.020	0.94	1.46	1.68	37.50*
<i>Siganus fuscescens</i>	0.030	0.010	0.91	1.00	1.63	39.13
<i>Sepia plangon</i>	0.020	0.040	0.90	1.49	1.60	40.73*
<i>Paramonacanthus lowei</i>	0.010	0.020	0.84	1.23	1.50	42.23
<i>Ambiserrula jugosa</i>	0.020	0.030	0.83	1.27	1.48	43.71*
<i>Synodus sageneus</i>	0.020	0.010	0.81	0.95	1.45	45.16
<i>Choerodon venustus</i>	0.020	0.010	0.81	0.86	1.44	46.60
<i>Grammatobothus polyophthalmus</i>	0.000	0.020	0.81	1.58	1.44	48.04*
<i>Sepia papuensis</i>	0.020	0.020	0.80	1.54	1.43	49.46*
<i>Chaetodermis penicilligera</i>	0.010	0.020	0.78	0.89	1.39	50.86

(b)

Groups BH2002 & BHC

Average dissimilarity = 46.98

Species	BH2002 Av.Abund.	BHC Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Sargassum sp.</i>	0.010	0.000	0.78	1.53	1.67	1.67*
<i>Lepidotrigla argus</i>	0.010	0.010	0.73	1.29	1.55	3.22
<i>Sicyonia lancifera</i>	0.000	0.000	0.72	1.25	1.52	4.74*
<i>Lobophora variegata</i>	0.020	0.000	0.71	1.36	1.52	6.26*
<i>Udotea sp.</i>	0.000	0.000	0.70	1.28	1.49	7.75*
<i>Apistus carinatus</i>	0.010	0.020	0.69	1.20	1.46	9.21*
<i>Dactylopus dactylopus</i>	0.000	0.000	0.68	1.21	1.45	10.66

Table 9. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in the Bustard Head Region and Bustard Head Closure C in 2002.

* denotes a significant difference between groups detected.

(a)

Groups BH2002 & BHD

Average dissimilarity = 53.18

Species	BH2002 Av.Abund.	BHD Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Pristotis jerdoni</i>	0.320	0.150	2.47	1.17	4.65	4.65
<i>Saurida undosquamis</i>	0.080	0.090	1.98	1.60	3.72	8.37*
<i>Gymnocranius audleyi</i>	0.070	0.100	1.96	1.46	3.68	12.04*
<i>Pentapodus nagasakiensis</i>	0.090	0.070	1.73	1.79	3.25	15.29*
<i>Lethrinus genivittatus</i>	0.240	0.180	1.56	1.30	2.94	18.23
<i>Portunus rubromarginatus</i>	0.100	0.120	1.44	1.20	2.71	20.94
<i>Nemipterus theodorei</i>	0.050	0.020	1.32	0.99	2.49	23.43
<i>Choerodon venustus</i>	0.020	0.050	1.25	0.84	2.36	25.78
<i>Upeneus tragula</i>	0.020	0.060	1.24	1.56	2.33	28.12*
<i>Pentapodus paradiseus</i>	0.050	0.010	1.18	0.99	2.23	30.34
<i>Sepia plangon</i>	0.020	0.050	1.09	1.53	2.05	32.39*
<i>Upeneus asymmetricus</i>	0.050	0.000	1.08	0.67	2.03	34.42
<i>Trachinocephalus myops</i>	0.030	0.020	1.01	1.26	1.91	36.32
<i>Acropora sp.</i>	0.070	0.000	1.01	0.58	1.89	38.22*
<i>Siganus fuscescens</i>	0.030	0.020	0.97	1.20	1.83	40.05
<i>Torquigener pallimaculatus</i>	0.030	0.060	0.97	1.40	1.82	41.87
<i>Inimicus caledonicus</i>	0.040	0.040	0.90	1.47	1.69	43.56
<i>Annachlamys flabellata</i>	0.030	0.010	0.89	1.22	1.68	45.24
<i>Grammatobothus polyophthalmus</i>	0.000	0.020	0.85	1.17	1.60	46.84
<i>Parapercis nebulosa</i>	0.020	0.030	0.85	1.37	1.59	48.43*
<i>Sepia papuensis</i>	0.020	0.020	0.85	1.33	1.59	50.02

(b)

Groups BH2002 & BHD

Average dissimilarity = 46.22

Species	BH2002 Av.Abund.	BHD Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Sargassum sp.</i>	0.010	0.000	0.82	1.47	1.77	1.77*
<i>Udotea sp.</i>	0.000	0.000	0.74	1.27	1.61	3.38*
<i>Abalistes stellaris</i>	0.000	0.000	0.69	1.12	1.49	4.88*
<i>Parapriacanthus ransonneti</i>	0.000	0.000	0.68	1.08	1.48	6.36*
<i>Acropora sp.</i>	0.070	0.000	0.67	1.13	1.45	7.81*
<i>Liocranium praepositum</i>	0.010	0.010	0.65	1.07	1.41	9.22
<i>Rogadius patriciae</i>	0.000	0.010	0.64	1.10	1.39	10.61*

Table 10. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in the Bustard Head Region and Bustard Head Closure D in 2002.

* denotes a significant difference between groups detected.

(a)

Groups BHB & BHC

Average dissimilarity = 46.58

Species	BHB	BHC	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Saurida undosquamis</i>	0.530	0.090	3.02	0.78	6.48	6.48
<i>Upeneus asymmetricus</i>	0.150	0.130	1.44	1.27	3.09	9.57
<i>Lethrinus genivittatus</i>	0.190	0.110	1.39	0.98	2.99	12.56
<i>Pristotis jerdoni</i>	0.060	0.100	1.20	1.38	2.57	15.13
<i>Pseudorhombus spinosus</i>	0.040	0.010	1.13	1.43	2.43	17.56
<i>Annachlamys flabellata</i>	0.020	0.030	1.05	1.19	2.25	19.81
<i>Trachinocephalus myops</i>	0.020	0.030	1.00	1.36	2.15	21.96
<i>Pentapodus paradiseus</i>	0.020	0.020	0.96	1.36	2.07	24.03
<i>Gymnocranius audleyi</i>	0.010	0.030	0.96	1.31	2.06	26.09
<i>Nemipterus theodori</i>	0.050	0.070	0.94	1.56	2.02	28.11
<i>Dasyatis kuhlii</i>	0.020	0.010	0.93	1.05	1.99	30.10
<i>Paramonacanthus lowei</i>	0.020	0.020	0.87	1.30	1.88	31.98
<i>Parapercis nebulosa</i>	0.000	0.020	0.87	2.06	1.86	33.84*
<i>Inimicus caledonicus</i>	0.030	0.040	0.86	1.55	1.84	35.68
<i>Torquigener pallimaculatus</i>	0.020	0.040	0.86	1.89	1.84	37.52
<i>Sepia papuensis</i>	0.000	0.020	0.81	2.01	1.73	39.25*
<i>Apistus carinatus</i>	0.040	0.020	0.79	1.39	1.70	40.96
<i>Chaetodermis penicilligera</i>	0.010	0.020	0.77	0.94	1.65	42.61
<i>Portunus rubromarginatus</i>	0.030	0.050	0.76	1.65	1.64	44.24
<i>Liocranium praepositum</i>	0.000	0.020	0.72	1.13	1.55	45.80*
<i>Upeneus tragula</i>	0.000	0.020	0.72	1.36	1.55	47.34
<i>Callionymus japonicus</i>	0.020	0.010	0.71	1.40	1.53	48.87
<i>Sepia plangon</i>	0.020	0.040	0.69	1.60	1.47	50.35

(b)

Groups BHB & BHC

Average dissimilarity = 38.50

Species	BHB	BHC	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Dactylopus dactylopus</i>	0.000	0.000	0.76	1.44	1.97	1.97*
<i>Parapercis nebulosa</i>	0.000	0.020	0.75	1.38	1.95	3.92*
<i>Sicyonia lancifera</i>	0.000	0.000	0.69	1.22	1.80	5.72*
<i>Batrachomoeus dubius</i>	0.000	0.000	0.69	1.22	1.79	7.51*
<i>Upeneus tragula</i>	0.000	0.020	0.66	1.18	1.72	9.23
<i>Metapenaeopsis lamellata</i>	0.000	0.000	0.63	1.10	1.63	10.86

Table 11. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in Bustard Head Closure B and Bustard Head Closure C in 2002.

* denotes a significant difference between groups detected.

(a)

Groups BHB & BHD

Average dissimilarity = 54.64

Species	BHB	BHD	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Upeneus asymmetricus</i>	0.150	0.000	3.09	3.30	5.65	5.65*
<i>Saurida undosquamis</i>	0.530	0.090	2.92	0.77	5.34	10.99
<i>Pentapodus nagasakiensis</i>	0.000	0.070	2.27	3.13	4.16	15.14*
<i>Gymnocranius audleyi</i>	0.010	0.100	1.87	1.40	3.43	18.58*
<i>Upeneus tragula</i>	0.000	0.060	1.70	2.27	3.11	21.69*
<i>Portunus rubromarginatus</i>	0.030	0.120	1.62	1.62	2.96	24.65
<i>Pristotis jerdoni</i>	0.060	0.150	1.48	1.43	2.72	27.37
<i>Pseudorhombus spinosus</i>	0.040	0.000	1.31	1.43	2.39	29.76*
<i>Parapercis nebulosa</i>	0.000	0.030	1.29	2.56	2.35	32.11*
<i>Apistus carinatus</i>	0.040	0.010	1.27	1.96	2.32	34.43*
<i>Nemipterus theodorei</i>	0.050	0.020	1.25	1.58	2.29	36.72*
<i>Lethrinus genivittatus</i>	0.190	0.180	1.22	1.06	2.24	38.96
<i>Torquigener pallimaculatus</i>	0.020	0.060	1.10	1.83	2.01	40.97
<i>Choerodon venustus</i>	0.010	0.050	1.09	0.72	1.99	42.95
<i>Dasyatis kuhlii</i>	0.020	0.020	0.99	1.12	1.82	44.77
<i>Callionymus japonicus</i>	0.020	0.000	0.87	1.53	1.59	46.37*
<i>Paramonacanthus lowei</i>	0.020	0.010	0.87	1.28	1.59	47.96
<i>Sepia plangon</i>	0.020	0.050	0.86	1.48	1.58	49.53
<i>Engyprosopon grandisquama</i>	0.040	0.010	0.83	1.54	1.51	51.04

(b)

Groups BHB & BHD

Average dissimilarity = 45.66

Species	BHB	BHD	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Pentapodus nagasa kiensis</i>	0.000	0.070	1.19	8.93	2.60	2.60*
<i>Upeneus asymmetricus</i>	0.150	0.000	1.03	2.32	2.26	4.86*
<i>Sorsogona tuberculata</i>	0.010	0.000	0.88	1.62	1.94	6.79*
<i>Lobophora variegata</i>	0.000	0.000	0.85	1.53	1.87	8.67*
<i>Onigocia spinosa</i>	0.000	0.010	0.84	1.53	1.84	10.50*

Table 12. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in Bustard Head Closure B and Bustard Head Closure D in.

* denotes a significant difference between groups detected.

(a)

Groups BHC & BHD

Average dissimilarity = 47.00

Species	BHC	BHD	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Upeneus asymmetricus</i>	0.130	0.000	2.48	1.60	5.27	5.27*
<i>Pentapodus nagasakiensis</i>	0.010	0.070	1.92	2.05	4.09	9.36*
<i>Gymnocranius audleyi</i>	0.030	0.100	1.67	1.28	3.55	12.91*
<i>Nemipterus theodorei</i>	0.070	0.020	1.40	1.41	2.98	15.89*
<i>Saurida undosquamis</i>	0.090	0.090	1.31	1.13	2.78	18.67
<i>Lethrinus genivittatus</i>	0.110	0.180	1.30	1.17	2.77	21.44
<i>Pristotis jerdoni</i>	0.100	0.150	1.27	1.25	2.71	24.15
<i>Upeneus tragula</i>	0.020	0.060	1.17	1.37	2.49	26.64
<i>Portunus rubromarginatus</i>	0.050	0.120	1.13	1.34	2.41	29.05
<i>Choerodon venustus</i>	0.010	0.050	1.11	0.79	2.36	31.41
<i>Trachinocephalus myops</i>	0.030	0.020	1.02	1.28	2.17	33.58
<i>Apistus carinatus</i>	0.020	0.010	0.90	1.46	1.92	35.50
<i>Annachlamys flabellata</i>	0.030	0.010	0.89	1.18	1.90	37.40
<i>Pentapodus paradiseus</i>	0.020	0.010	0.88	1.49	1.88	39.28
<i>Dasyatis kuhlii</i>	0.010	0.020	0.86	0.97	1.83	41.12
<i>Grammatobothus polyophthalmus</i>	0.020	0.020	0.84	1.40	1.79	42.91
<i>Paramonacanthus lowei</i>	0.020	0.010	0.81	1.23	1.71	44.62
<i>Inimicus caledonicus</i>	0.040	0.040	0.78	1.44	1.66	46.28
<i>Rogadius patriciae</i>	0.010	0.010	0.75	1.19	1.59	47.87*
<i>Chaetodermis penicilligera</i>	0.020	0.010	0.73	0.89	1.55	49.43
<i>Liocranium praepositum</i>	0.020	0.010	0.68	1.22	1.45	50.88

(b)

Groups BHC & BHD

Average dissimilarity = 40.28

Species	BHC	BHD	Av.Diss.	Diss./SD	Contrib.%	Cum.%
	Av.Abund.	Av.Abund.				
<i>Upeneus asymmetricus</i>	0.130	0.000	0.94	2.36	2.33	2.33*
<i>Lobophora variegata</i>	0.000	0.000	0.78	1.54	1.94	4.27*
<i>Pentapodus nagasakiensis</i>	0.010	0.070	0.73	1.38	1.81	6.07*
<i>Lepidotrigla argus</i>	0.010	0.000	0.68	1.25	1.68	7.76*
<i>Erosa erosa</i>	0.000	0.000	0.62	1.13	1.55	9.31
<i>Apistus carinatus</i>	0.020	0.010	0.59	1.10	1.47	10.78

Table 13. (a) Average dissimilarity value and species contributing to the upper 50% (catch rate data); (b) average dissimilarity value and species contributing to the upper 10% (presence/absence data) in Bustard Head Closure C and Bustard Head Closure D in 2002.

* denotes a significant difference between groups detected.

(a)

Groups BH2000 & BH2002

Average dissimilarity = 68.00

Species	BH2000 Av.Abund.	BH2002 Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%*
<i>Pristotis jerdoni</i>	0.050	0.320	2.96	1.05	4.35	4.35*
<i>Lethrinus genivittatus</i>	0.080	0.240	2.25	1.28	3.31	7.66*
<i>Saurida undosquamis</i>	0.120	0.080	2.20	1.76	3.23	10.89*
<i>Torquigener pallimaculatus</i>	0.250	0.030	1.91	0.76	2.80	13.69*
<i>Pentapodus nagasakiensis</i>	0.040	0.090	1.89	1.10	2.78	16.48
<i>Nemipterus theodori</i>	0.070	0.050	1.70	1.10	2.51	18.98
<i>Portunus rubromarginatus</i>	0.100	0.100	1.57	1.19	2.31	21.29
<i>Upeneus asymmetricus</i>	0.050	0.050	1.49	0.83	2.19	23.48*
<i>Gymnocranius audleyi</i>	0.000	0.070	1.46	0.85	2.15	25.63
<i>Trachinocephalus myops</i>	0.070	0.030	1.45	1.21	2.13	27.75*
<i>Inimicus caledonicus</i>	0.000	0.040	1.43	1.52	2.10	29.85*
<i>Pentapodus paradiseus</i>	0.010	0.050	1.39	0.97	2.04	31.89*
<i>Metapenaeopsis palmensis</i>	0.040	0.010	1.36	1.33	2.00	33.88
<i>Siganus fuscescens</i>	0.030	0.030	1.22	0.95	1.79	35.67
<i>Annachlamys flabellata</i>	0.030	0.030	1.21	1.14	1.78	37.45*
<i>Sponge</i>	0.050	0.010	1.16	0.67	1.70	39.15*
<i>Paramonacanthus otisensis</i>	0.040	0.020	1.05	1.38	1.55	40.70*
<i>Acropora sp.</i>	0.000	0.070	1.05	0.57	1.55	42.25*
<i>Pentacaster sp.</i>	0.030	0.000	1.00	0.86	1.48	43.72*
<i>Inimicus sinensis</i>	0.030	0.000	1.00	0.98	1.47	45.19*
<i>Ambiserrula jugosa</i>	0.000	0.020	0.96	1.21	1.41	46.60
<i>Parapercis nebulosa</i>	0.030	0.020	0.93	1.36	1.37	47.97
<i>Dendronephthya spp</i>	0.020	0.010	0.92	0.82	1.35	49.32*
<i>Inegocia japonica</i>	0.020	0.000	0.89	1.14	1.32	50.63

(b)

Groups BH2000 & BH2002

Average dissimilarity = 60.41

Species	BH2000 Av.Abund.	BH2002 Av.Abund.	Av.Diss.	Diss./SD	Contrib.%	Cum.%
<i>Inimicus caledonicus</i>	0.000	0.040	1.21	2.83	2.00	2.00*
<i>Metapenaeopsis mogiensis</i>	0.000	0.010	1.03	1.89	1.71	3.72*
<i>Ambiserrula jugosa</i>	0.000	0.020	0.92	1.52	1.53	5.24*
<i>Synodus tectus</i>	0.000	0.010	0.91	1.53	1.51	6.75*
<i>Metapenaeopsis palmensis</i>	0.040	0.010	0.91	1.38	1.50	8.25*
<i>Gymnocranius audleyi</i>	0.000	0.070	0.88	1.33	1.46	9.71*
<i>Inegocia japonica</i>	0.020	0.000	0.86	1.36	1.43	11.14*

Table 14. (a) Average dissimilarity value contributing to the upper 50% (catch rate data); (b) average dissimilarity value contributing to the upper 10% (presence/absence data) in the Bustard Head Region in 2000 and Bustard Head Region in 2002.

* denotes a significant difference between groups detected.

Hervey Bay Region ordination plot

The ordination plot of samples from the Hervey Bay Region is a good representation of the similarity matrix data used to produce it (Stress = 0.17). More discrete clustering occurred for 2002 sub-regions than those of 2000. All the 2002 sub-regions are more similar to other 2002 sub-regions than to any 2000 sub-region. Some overlap exists between samples from Hervey Bay (HB2000) and south Bustard Head samples (SBH200) from 2000. One outlier from Hervey Bay Closure A (HBA) in 2002 is unlike any other sample from the region (Figure 19).

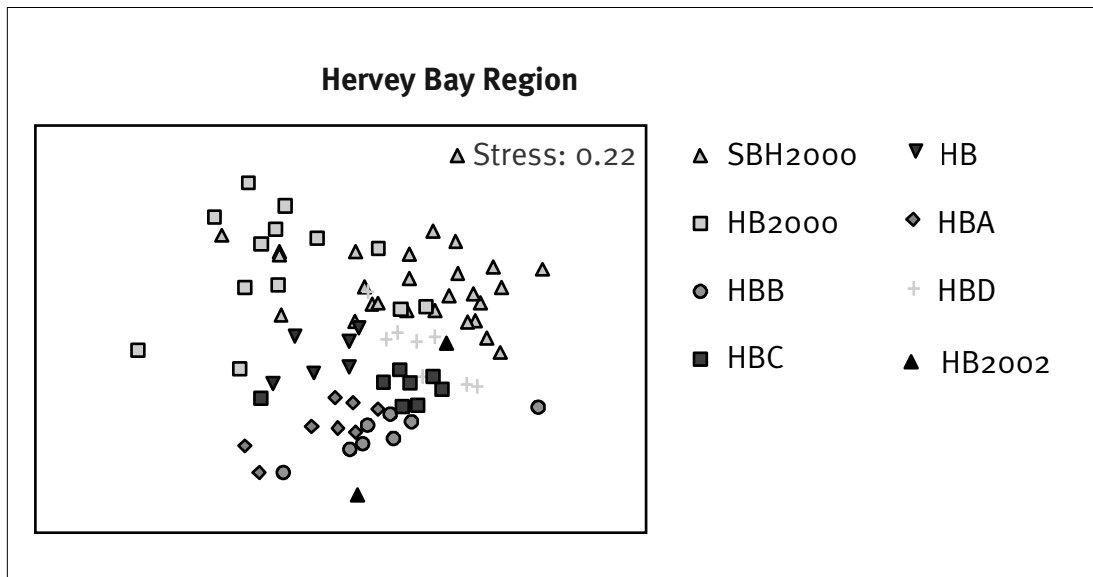


Figure 19. Multi-dimensional scaling of benthic fauna samples from Hervey Bay Region (HB, HB2000, HBA, HBB, HBC, HBD, HB2002) (n = 54) and south Bustard Head Region (SBH2000) (n = 27).

Hervey Bay Region similarity summaries

Hervey Bay Region 2000

The most important contributor to overall similarity (~45%) in Hervey Bay in 2000 for the closure and non-closure alike (HB and HB2000 respectively) was the moderately abundant *Saurida undosquamis* (both data types). *Portunus rubromarginatus* also contributed to detected similarity in the closure and the non-closure (both data types). Two other species, *Torquigener pallimaculatus* (more so in closure) and *Paramonacanthus otisensis* (more so in non-closure), also contributed to similarity in each sub-region (both data types). The moderate abundance of *Annachlamys flabellata* and *Inimicus sinensis* further characterised closure samples while the moderately abundant *Lethrinus genivittatus* was characteristic of the non-closure samples (Figure 20 and Figure 21).

Hervey Bay Closures 2002

The samples from the closures of Hervey Bay in 2002 (HBA, HBB, HBC, HBD) exhibited low to moderately high within sub-region similarity (~40-65%). A large portion of this similarity in each closure was accounted for by moderate abundances of *Portunus rubromarginatus* and *Saurida undosquamis* (abundance data). Moderate to low abundances of *Paramonacanthus otisensis* and *Engyprosopon grandisquama* also contributed to similarity (abundance data) in all closures. In Closures A and B the low abundance of *Inimicus caledonicus* and *Pristotis jerdoni* (abundance data) and the presence of *Sepia papuensis* and sponge (binary data) were identified as important contributors to sample similarity.

In Closures B and C it was *Torquigener pallimaculatus* in moderate abundance contributing further to sample similarity (binary data). In Closure D the high abundance of *Upeneus asymmetricus* and moderate abundance of *Saurida undosquamis* accounted for much similarity in both data types (Figure 22, Figure 23, Figure 24 and Figure 25).

Hervey Bay Region 2002

Moderate similarity between samples (~50%) was observed in the Hervey Bay non-closure region (HB2002) in 2002. Moderate abundances of *Nemipterus theodorei*, *Portunus rubromarginatus*, *Paramonacanthus otisensis* (abundance data) and lower abundances of *Pristotis jerdoni* (both data types) accounted for much of the observed similarity of samples in this sub-region (Figure 26).

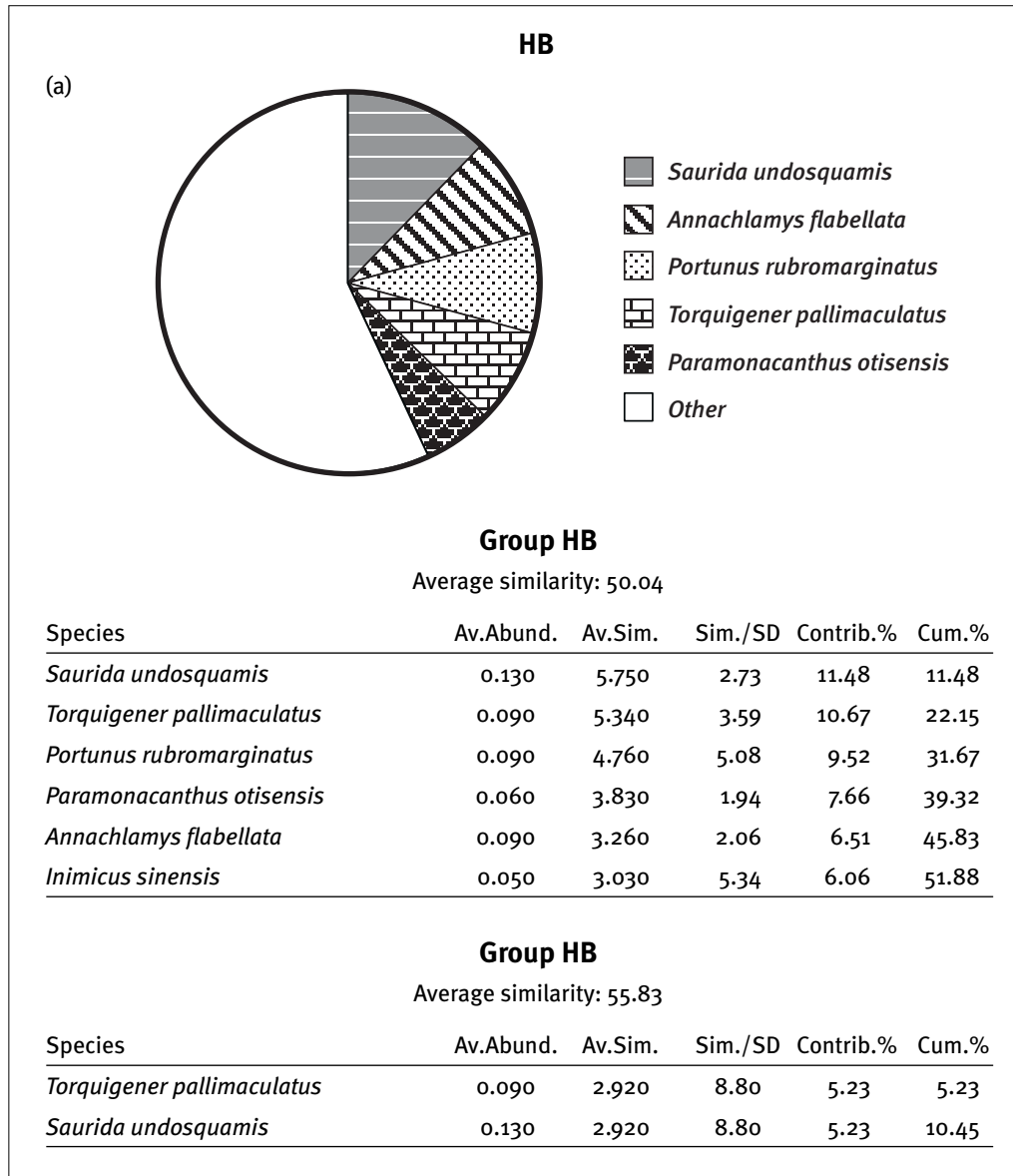


Figure 20. Hervey Bay Closure 2000 (a) five most abundant species (b) average similarity value and species contributing to the upper 50% (catch rate data); (b) average similarity value and species contributing to the upper 10% (presence/absence data).

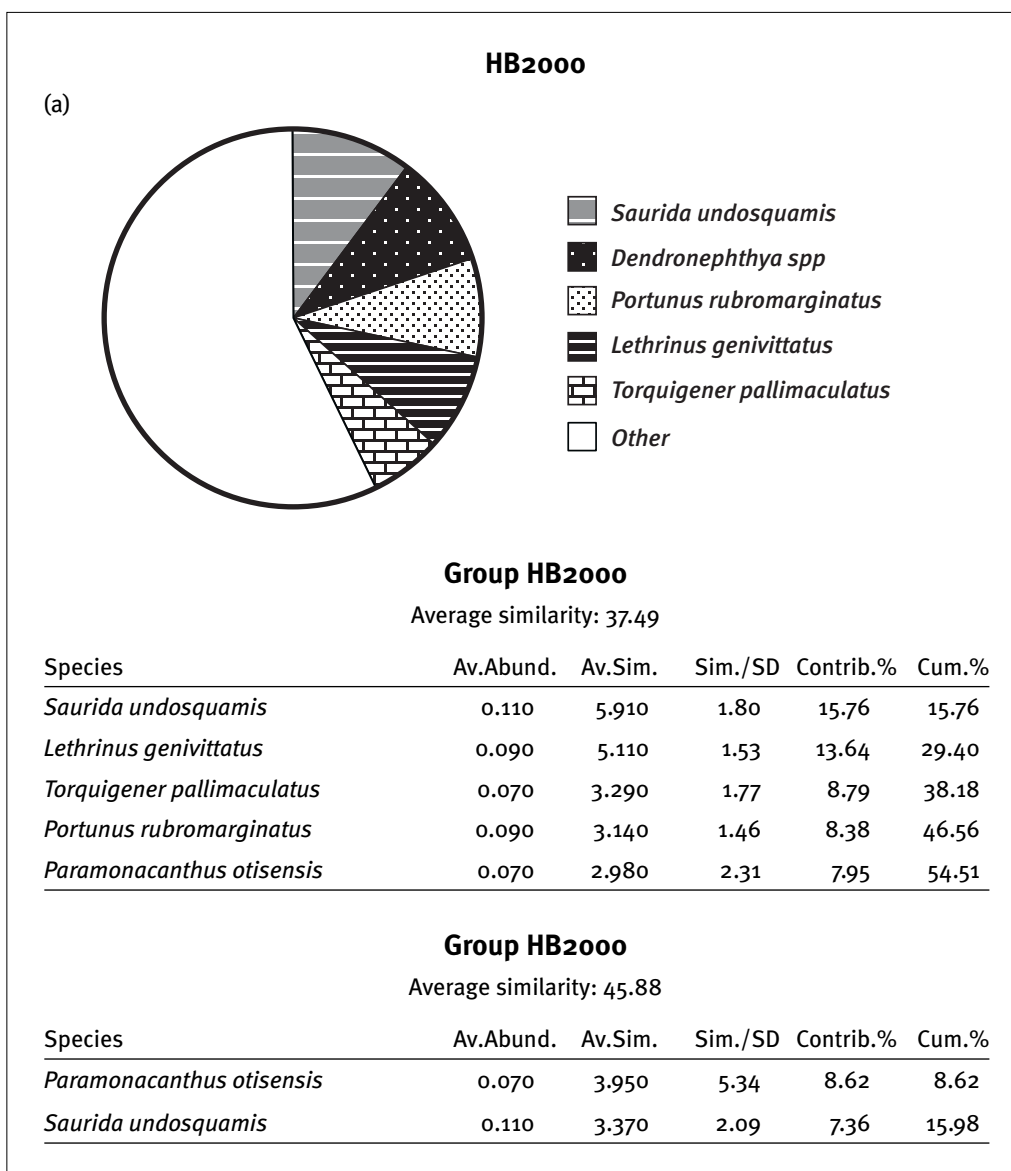


Figure 21. Hervey Bay Region 2000 (a) five most abundant species; (b) average similarity value and species contributing to the upper 50% (catch rate data); (c) average similarity value and species contributing to the upper 10% (presence/absence data).

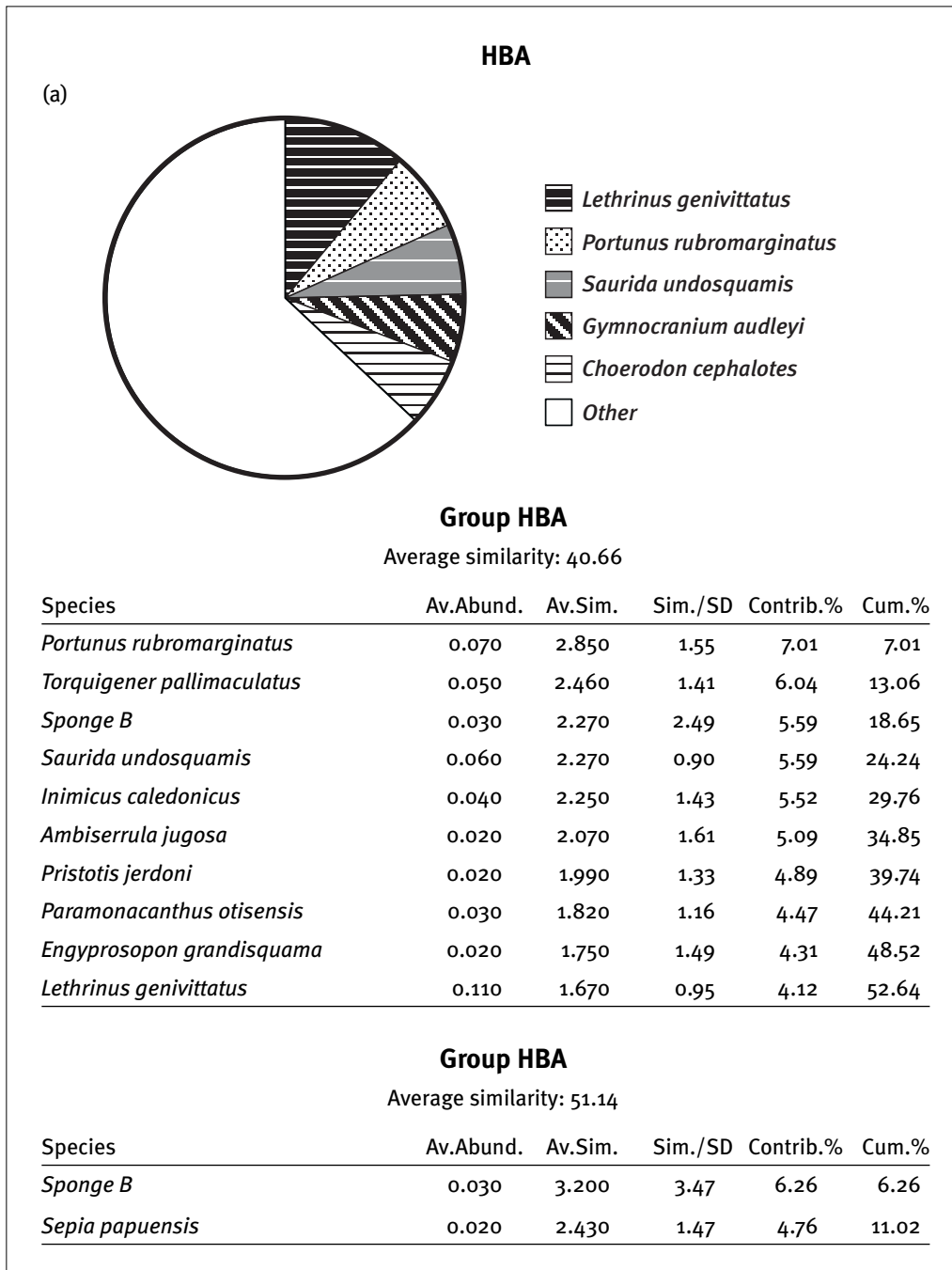


Figure 22. Hervey Bay Closure A 2002 (a) five most abundant species; (b) average similarity value and species contributing to the upper 50% (catch rate data); (c) average similarity value and species contributing to the upper 10% (presence/absence data).