Appendix H

Supporting Data

2011 Regional Stations

Macrobenthic Communities

Appendix H.1

Regional three-way PERMANOVA results for benthic infauna. df = degrees of freedom, SS = sums of squares, MS = mean squares, P(perm) = permutation p-value.

	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Sediment type	4	16,962	4240.4	1.7437	0.0001	9786
Depth stratum	2	20,956	10,478.0	4.3087	0.0001	9831
Year	1	3762	3761.6	1.5468	0.0205	9885
Sediment type x depth stratum[a]	6	28,059	4676.5	1.9230	0.0001	9773
Sediment type x year[a]	6	18,356	3059.3	1.2580	0.0231	9773
Depth x year	6	17,469	2911.6	1.1972	0.0516	9769
Sediment type x depth x year[a]	7	19,226	2746.6	1.1294	0.1216	9744
Residuals	85	207,000	2431.9			
Total	121	444,000				

[a]Term has one or more empty cells.

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Appendix H.2

Description of individual cluster groups A–O for regional samples collected between 2009–2011.

Description of cluster groups

Cluster group A consisted of two sites occurring along the 25-m isobath north of Point Loma (Figure 9.4), and was analogous to cluster group G found during analysis of SBOO fixed grid stations (see Chapter 5). These grabs housed the second highest invertebrate abundances of all cluster groups with an average of 564 individuals/grab, and possessed an average species richness of 63 taxa/grab (Table 9.5). Sediments were coarse to sandy with percent fines ranging from only 0% to 3.5% (Appendix H.3). The five most abundant taxa encountered were the polychaetes *Pareurythoe californica*, *Pisione* sp, *Polycirrus* sp, *Lumbrineris latreilli*, and *Spio maculata*. These species averaged between 30–55 individuals/grab. No other species occurred at densities > 28 individuals/grab. SIMPER revealed the five most characteristic species to be nematodes, the polychaetes *Pisione* sp, *Hesionura coineaui difficilis*, and *Protodorvillea gracilis*, and the isopod *Eurydice caudata*.

Cluster group B consisted of a single site that occurred near the mouth of La Jolla canyon (Figure 9.4). Species richness and abundance were relatively low with 33 taxa and 105 individuals/grab, respectively (Table 9.5). Sediments were coarse, possessing no fines (Appendix H.3). The most abundant species encountered were the polychaetes *Spiophanes norrisi*, individuals from the *Aphelochaeta glandaria* Cmplx, *Aphelochaeta* sp SD13, and *Chaetozone commonalis*, *Monticellina serratiseta*, the bivalve *Simomactra falcata*, and the echinoderm *Dendraster excentricus*; these species numbered between 4–31 individuals/grab. No other species exhibited > 3 individuals/grab.

Cluster group C consisted of six sites ranging from 40–60 m depths located in the SBOO monitoring region (Figure 9.4). Average species richness and mean abundance were 74 taxa and 314 individuals/grab, respectively (Table 9.5). Cluster group C was characterized by sandy sediments containing substantial quantities of red relict sand. Percent fines ranged from 0% to 26.8% (Appendix H.3). The five most abundant species encountered were the polychaetes *Spiophanes norrisi*, *Mooreonuphis* sp SD1, *Mooreonuphis* sp, *Lanassa venusta venusta*, and *Spio maculata*; these species averaged between about 12–54 individuals/grab. No other species exhibited > 8 individuals/grab. SIMPER revealed the five most characteristic species to be *S. norrisi*, *Mooreonuphis* sp, *M.* sp SD1, *L. venusta venusta*, and the isopod *Eurydice caudata*.

Cluster group D was the second largest cluster group and consisted of 14 sites occurring between 20–40-m depths in the SBOO monitoring region and north of Point Loma (Figure 9.4). Average species richness and mean abundance were 90 taxa and 356 individuals/grab, respectively (Table 9.5). Sediments were sandy with percent fines ranging from 5.7%–26.8% (Appendix H.3). The polychaetes *Spiophanes norrisi*, *Mooreonuphis nebulosa*, *Monticellina siblina*, *Mediomastus* sp, and *Spiophanes duplex* were the most abundant species encountered; these species averaged between about 10–50 individuals/grab. No other species averaged > 9 individuals per grab. The five most characteristic invertebrates found in these assemblages included the polychaetes *Spiophanes norrisi, Monticellina siblina,* and *Mediomastus* sp, the amphipod *Ampelisca brevisimulata*, and the bivalve *Tellina modesta*.

Cluster group E consisted of three sites located between 22–36 m depths that spanned from west of Point Loma to the SBOO (Figure 9.4). These sites possessed the highest invertebrate species richness and highest abundance of any cluster group, averaging 135 taxa and 650 individuals/grab, respectively (Table 9.5). Sediments were sandy to coarse, with percent fines ranging from 3.7% to 9.6% (Appendix H.3). *Spiophanes norrisi* dominated these sites, averaging 144 individuals per grab. Other dominant species included the polychaetes *Chaetozone* sp SD5, *Apoprionospio*

pygmaea, and *Mediomastus* sp, and the sipunculid *Apionsoma misakianum*, which occurred at average densities between about 14–43 individuals/grab. No other species exhibited >12 individuals/grab. SIMPER revealed the five most characteristic species of the group to be the polychaetes *S. norrisi, Mediomastus* sp, *Ampharete labrops,* Euclymeninae sp A, and *Phyllodoce hartmanae*.

Cluster group F contained 5 sites located at the mouth of San Diego Bay (Figure 9.4). This cluster group possessed the second lowest species richness with 28 taxa/grab, and a relatively low species abundance of 147 individuals/grab (Table 9.5). Sediments were sandy with percent fines ranging from only 0% to 2.2% (Appendix H.3). The most abundant species at these sites were the arthropods *Gibberosus myersi*, *Metharpinia jonesi*, and *Anchicolurus occidentalis,* the polychaete *Apoprionospio pygmaea*, and juvenile actiniarians too small to identify to species. These taxa averaged between about 10–21 individuals/grab. No other species exhibited >6 individuals/grab. SIMPER revealed the five most characteristic species for the clade to be *G. myersi*, *M. jonesi*, *A. occidentalis*, *A. pygmaea,* and the polychaete *Spiophanes norrisi* as well as the polychaete. This cluster group is similar to cluster group C found during analysis of SBOO fixed grid stations (see Chapter 5).

Cluster group G comprised four sites that possessed sandy sediments and were located at the mouths of the San Diego River and San Diego Bay (Figure 9.4). Average species richness and mean abundance were 48 taxa and 422 individuals/grab, respectively (Table 9.5). Percent fines ranged from 0.3% to 4.2% (Appendix H.3). Sites were dominated by the oweniid polychaete *Owenia collaris*, with an average of 184 individuals/site. Other dominant species included the anthozoan *Zaolutus actius*, the polychaete *Spiophanes norrisi*, and the arthropods *Diastylopsis tenuis* and *Rhepoxynius abronius*; these species averaged between about 12–32 individuals/grab. No other taxon averaged >11 organisms/grab. The five most characteristic taxa for this clade included *O. collaris, Z. actius, S. norrisi*, the nemertean *Carinoma mutabilis*, and the bivalve *Tellina modesta*.

Cluster group H consisted of a single site located in extremely shallow water (13 m) north of the Tijuana River (Figure 9.4). Species richness and abundance were 39 taxa and 92 individuals/grab, respectively (Table 9.5). Sediments consisted of sand with percent fines equaling 18.6% (Appendix H.3). This site possessed many unique species, with the five most abundant taxa being polychaetes from the *Scoletoma tetraura* Cmplx and *Ampharete labrops*, the gastropods *Astyris gausapata* and *Rictaxis punctocaelatus*, and the arthropod *Exacanthomysis davisi*; these species numbered between 4–18 individuals/grab. No other species averaged >3 individuals/grab.

Cluster group I possessed nine sites located between 10–20-m depths in the SBOO monitoring region (Figure 9.4). Average species richness and abundance were 41 taxa and 133 individuals/grab, respectively (Table 9.5). Sediments were primarily sandy with percent fines ranging from 3.3% to 46.0% (Appendix H.3). The most abundant species at these sites were the polychaetes *Owenia collaris* (but at much lower densities than observed in cluster group G), *Spiophanes norrisi*, *Polydora cirrosa*, *S. duplex*, and *Mediomastus* sp; these species averaged between about 7–13 individuals/grab. No other species averaged >5 individuals/grab. SIMPER revealed the five most characteristic species for the clade to be *S. duplex, Mediomastus* sp, the bivalves *Siliqua lucida* and *Tellina modesta*, and the polychaete *Glycinde armigera*.

Cluster group J consisted of six sites with depths ranging from 286–357 m located along the upper slope (Figure 9.4). Average species richness and mean abundance were 35 taxa and 97 individuals/grab, respectively (Table 9.5). Sediments contained percent fines ranging from 65.0% to 78.8% (Appendix H.3), with a minor sandy constituent. The five most

abundant species encountered were the bivalves *Macoma carlottensis*, *Nuculana conceptionis*, the scaphopod *Compressidens stearnsii*, and the polychaetes *Maldane sarsi* and other juvenile maldanids; these species averaged between about 4–14 individuals/grab. No other species averaged > 3 individuals/grab. SIMPER revealed the five most characteristic species for the clade to be *M. carlottensis, C. stearnsii, M. sarsi*, the bivalve *Ennucula tenuis*, and the polychaete *Paraprionospio alata*.

Cluster group K consisted of six sites with depths ranging from 393–433 m located along the upper slope (Figure 9.4). Average species richness and mean abundance were 27 taxa and 78 individuals/grab, respectively (Table 9.5). Sediments contained percent fines ranging from 49.9% to 82.5% (Appendix H.3), with a substantial sandy constituent. The most abundant species encountered were the bivalves *Yoldiella nana* and *Nuculana conceptionis*, and the polychaetes *Maldane sarsi*, *Eclysippe trilobata*, *Fauveliopsis glabra*, and *Myriochele gracilis*; these species averaged between about 3–12 individuals/grab. No other species averaged > 2 individuals/grab. SIMPER revealed the five most characteristic species for the clade to be *Y. nana, M. sarsi*, *E. trilobata*, *N. conceptionis,* and the bivalve *Ennucula tenuis*.

Cluster group L contained only one site located at a 312 m depth on the northeast side of the Coronado Bank (Figure 9.4). Species richness and abundance were 72 taxa and 247 individuals/grab (Table 9.5). Sediments consisted of sand with percent fines equaling 45.5%. The polychaete *Fauveliopsis glabra* was particularly abundant with 55 individuals recorded/grab. Other dominant species included amphiurids, the bivalve *Adontorhina cyclia*, the polychaete *Maldane sarsi*, and the sipunculid *Nephasoma diaphanes*; all of which ranged from 10–21 individuals. No other species averaged > 9 individuals/grab.

Cluster group M represented sites occurring on the Coronado Bank at depths ranging from 122–197 m. One additional site located on the outer shelf north of Point Loma also clustered together with this group (Figure 9.4). Species richness and abundance were 66 taxa and 220 individuals/grab (Table 9.5). Sediments consisted primarily of sand with percent fines ranging from 5.4% to 35.2% (Appendix H.3). The most abundant species included polychaetes from the *Aphelochaeta glandaria* Cmplx, *Chaetozone* sp SD5, and *Monticellina siblina*, the bivalves *Tellina carpenteri* and *Micranellum crebricinctum*, and the ophiuroid *Amphiodia digitata*; these species averaged between about 7–24 individuals/grab. No other taxon averaged > 6 organisms/grab. The five most characteristic taxa for this clade included *A. glandaria* Cmplx, *C.* sp SD5, *T. carpenteri, A. digitata*, and the bivalve *Huxleyia munita*.

Cluster group N was the largest cluster group, containing 33% of sites surveyed. Sites were restricted to mid- and outer shelf depths and predominantly possessed sediments of sand with percent fines ranging from 3.7% to 61.7% (Figure 9.4, Appendix H.3). Sites in cluster group N were dominated by the urchin *Amphiodia urtica*, which averaged 56 individuals/grab. Other abundant species included unidentified species in the genus *Amphiodia*, the bivalves *Axinopsida serricata* and *Ennucula tenuis*, and the polychaetes *Mediomastus* sp, *Spiophanes berkeleyorum*, *Travisia brevis*, and *Prionospio* (*Prionospio*) *dubia*; these species averaged between about 3–13 individuals/grab. No other taxon averaged > 4 organisms/grab. The five most characteristic taxa for this clade included *A. urtica, A. serricata, Amphiodia* sp, *P.* (*P.*) *dubia*, and the polychaete *Sternaspis fossor*.

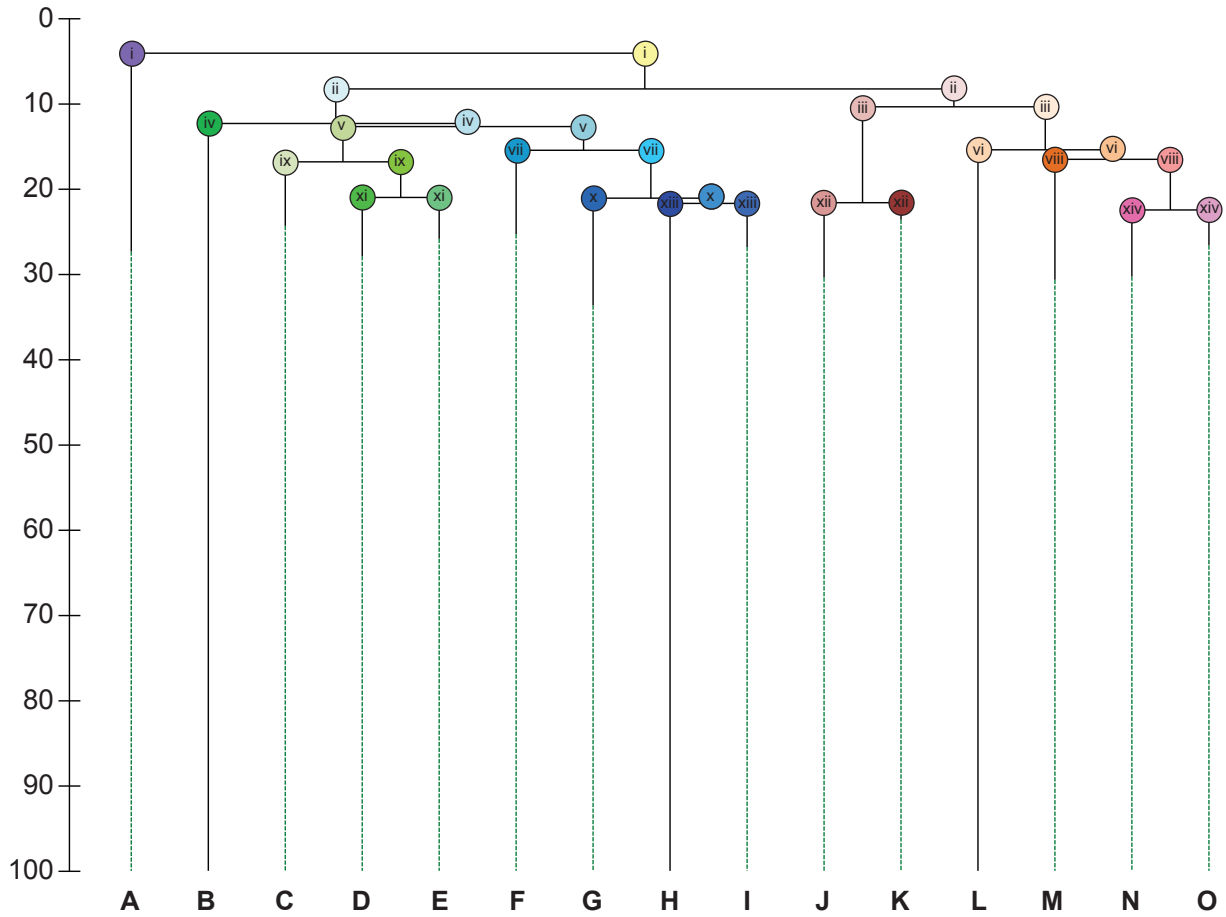
Cluster group O was the third largest cluster group, and possessed 13 sites located on the outer shelf west of Point Loma (Figure 9.4). Species richness and abundance were 55 taxa and 144 individuals/grab (Table 9.5). Sediments

contained percent fines ranging from 48.8% to 79.9% (Appendix H.3), with a substantial sandy fraction. The five most abundant species encountered were the polychaetes *Spiophanes kimballi*, *Mediomastus* sp, and *Melinna heterodonta*, and the bivalves *Axinopsida serricata* and *Tellina carpenteri*; these species averaged between about 4–9 individuals/grab. No other taxon averaged >3 organisms/grab. SIMPER revealed the five most characteristic species for the clade to be *S. kimballi, T. carpenteri, Mediomastus* sp, *M. heterodonta*, and the polychaete *Paraprionospio alata.*

Appendix H.3

Delineation of cluster groups (see Figure 9.4) by species exclusivity (i.e., species that occur solely in each supported clade versus species that occur in multiple non-related clades). No species occurred across all cluster groups. Inner = inner shelf, mid = mid shelf, outer = outer shelf, slope = upper slope. S = sand, Sc = sand with coarse, Sf = sand with fines, Scf = sand with coarse and fines, Fs = fines with sand, Fc = fines with coarse, Cs = coarse with sand. CG = cluster group.

			Depth				Fines			
CG	***n***	**stratum**	**mean**	**min**	**max**	**Sed.**	**mean**	**min**	**max**	**depth/sediment exceptions**
A	2	inner	25	24	26	Sc/Cs	1.8	0.0	3.5	—
B	1	inner	12	12	12	Sc	0.0	0.0	0.0	—
C	6	mid	46	38	58	Sc	5.9	0.0	26.8	Sf = 1
D	14	inner	28	21	40	Sf	14.5	5.7	26.8	S/inner = 6, Sf/mid = 4
E	3	mid	30	22	36	varied	6.5	3.7	9.6	Scf/inner = 1, Cs/mid = 1, Sc/mid = 1
F	5	inner	12	9	19	S	0.6	0.0	2.2	Sc = 1
G	4	inner	12	10	13	S	2.2	0.3	4.2	—
H	1	inner	13	13	13	Sf	18.6	18.6	18.6	—
I	9	inner	16	10	20	Sf	14.8	3.3	46.0	S = 3
J	6	slope	331	286	357	Fs	71.7	65.0	78.8	—
K	6	slope	415	393	433	Fs	70.9	49.4	82.5	Sc = 1
L	1	slope	312	312	312	Sf	45.5	45.5	45.5	—
M	11	outer	150	122	197	Sf	20.6	5.4	35.2	Sc = 2
N	40	mid	83	50	147	Sf	45.2	3.7	61.7	Fs/mid = 13, Sc/mid = 1, Sf/outer = 4
O	13	outer	201	151	263	Fs	60.8	48.8	79.9	Sf/outer = 1, Fc/outer = 1, Fs/upper = 6



Appendix H.3 *continued*

(i.) Species delineating the separation of cluster group A from all other cluster groups (4.04% similarity)

	A	B	C	D	E	F
Pareurythoe californica	55	0	0	0	0	0
Rhabdocoela sp A	21	0	0	0	0	0
Oligochaeta	8	0	0	0	0	0
Polygordius sp SD1	7.5	0	0	0	0	0
Saccocirrus sp	6.5	0	0	0	0	0
Phyllodoce medipapillata	5.5	0	0	0	0	0
Polynoinae	3.5	0	0	0	0	0
Tiburonella viscana	3	0	0	0	0	0
Leptoplanidae sp SD2	2	0	0	0	0	0
Polycladida sp SD2	2	0	0	0	0	0
Questa caudicirra	2	0	0	0	0	0
Gyptis sp	1	0	0	0	0	0
Opisthodonta sp SD1	1	0	0	0	0	0
additional 15 taxa (<1.0)	x	0	0	0	0	0

(ii.) Species delineating the separation of cluster groups B, C, D, E, F, G, H, and I from cluster groups J, K, L, M, N, and O (8.23% similarity)

	A	B	C	D	E	F
Compressidens stearnsii	0	0	0	0	0	0
Chiridota sp	0	0	0	0	0	0
Glycera nana	0	0	0	0	0	0
Tellina carpenteri	0	0	0	0	0	0

(iii.) Species delineating the separation of cluster groups J and K from cluster groups L, M, N, and O (10.33% similarity)

	A	B	C	D	E	F
Nuculana conceptionis	0	0	0	0	0	0
Chaetoderma nanulum	0	0	0	0	0	0

(iv.) Species delineating the separation of cluster group B from cluster groups C, D, E, F, G, H, and I (12.3% similarity)

	A	B	C	D	E	F
Balcis oldroydae	0	1	0	0	0	0
Paraonella platybranchia	0	1	0	0	0	0
Stylatula elongata	0	1	0	0	0	0
Tivela stultorum	0	1	0	0	0	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

G	H	I	J	K	L	M	N	O
0	0	0	4.5	0.83	8	0.36	0.23	0.85
0	0	0	1	0.17	1	0.09	1.23	0.46
0	0	0	0.5	0.5	1	0.82	1.85	1.69
0	0	0	0.17	0.33	8	8.73	1.28	6.77

G	H	I	J	K	L	M	N	O
0	0	0	5.5	7	0	0	0	0
0	0	0	0.17	0.17	0	0	0	0

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Appendix H.3 *continued*

(v.) Species delineating the separation of cluster groups C, D, and E from cluster groups F, G, H, and I (12.65% similarity)

	A	B	C	D	E	F
Exogone dwisula	0	0	0.17	0.14	0.33	0

(vi.) Species delineating the separation of cluster group L from cluster groups M, N, and O (15.38% similarity)

	A	B	C	D	E	F
Cadulus californicus	0	0	0	0	0	0
Amphitritinae	0	0	0	0	0	0
Anoplodactylus sp	0	0	0	0	0	0
Apionsoma sp	0	0	0	0	0	0
Dodecaceria sp	0	0	0	0	0	0
Hoplonemertea sp SD2	0	0	0	0	0	0
Lysianassoidea	0	0	0	0	0	0
Pannychia moseleyi	0	0	0	0	0	0
Paradoneis eliasoni	0	0	0	0	0	0
Sphaerosyllis sp	0	0	0	0	0	0
Aricidea (*Allia*) *antennata*	0	0	0	0	0	0
Ampelisca hancocki	0	0	0	0	0	0
Monoculodes emarginatus	0	0	0	0	0	0
Lysippe sp B	0	0	0	0	0	0
Malmgreniella sanpedroensis	0	0	0	0	0	0
Levinsenia gracilis	0	0	0	0	0	0
Tanaella propinquus	0	0	0	0	0	0
Cardiomya pectinata	0	0	0	0	0	0
Cuspidaria parapodema	0	0	0	0	0	0

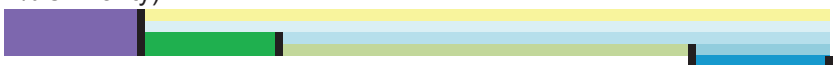
Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0

G	H	I	J	K	L	M	N	O
0	0	0	0	0	2	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0.82	0.2	0.08
0	0	0	0	0	0	0.73	1.08	0.15
0	0	0	0	0	0	0.64	0.55	0.31
0	0	0	0	0	0	0.27	1.43	0.31
0	0	0	0	0	0	0.27	0.2	0.08
0	0	0	0	0	0	0.18	0.43	1.46
0	0	0	0	0	0	0.09	0.4	0.77
0	0	0	0	0	0	0.09	0.08	0.08
0	0	0	0	0	0	0.09	0.05	0.62

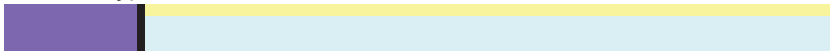
Appendix H.3 *continued*

(vii.) Species delineating the separation of cluster group F from cluster groups G, H, and I (15.44% similarity)



	A	B	C	D	E	F
Metamysidopsis elongata	0	0	0	0	0	3
Dendraster sp	0	0	0	0	0	2.2
Eohaustorius barnardi	0	0	0	0	0	2
Chaetozone bansei	0	0	0	0	0	1
Euphilomedes longiseta	0	0	0	0	0	0.8
Rhepoxynius lucubrans	0	0	0	0	0	0.6
Eulalia sp	0	0	0	0	0	0.2
Exosphaeroma rhomburum	0	0	0	0	0	0.2
Heteropodarke heteromorpha	0	0	0	0	0	0.2
Nereis latescens	0	0	0	0	0	0
Rhynchospio arenincola	0	0	0	0	0	0

(viii.) Species delineating the separation of cluster group M from cluster groups N and O (16.49% similarity)



	A	B	C	D	E	F
Mooreonuphis segmentispadix	0	0	0	0	0	0
Urothoe elegans Cmplx	0	0	0	0	0	0
Clavopora occidentalis	0	0	0	0	0	0
Naineris uncinata	0	0	0	0	0	0
Caecognathia sp SD1	0	0	0	0	0	0
Mooreonuphis exigua	0	0	0	0	0	0
Scoloura phillipsi	0	0	0	0	0	0
additional 27 taxa (<0.45)	0	0	0	0	0	0
Travisia brevis	0	0	0	0	0	0
Rhepoxynius bicuspidatus	0	0	0	0	0	0
Heterophoxus oculatus	0	0	0	0	0	0
Nuculana sp A	0	0	0	0	0	0
Aglaophamus verrilli	0	0	0	0	0	0
additional 16 taxa (<0.95)	0	0	0	0	0	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1	3	0.11	0	0	0	0	0	0
0.25	2	0.11	0	0	0	0	0	0

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	2.91	0	0
0	0	0	0	0	0	1.27	0	0
0	0	0	0	0	0	0.82	0	0
0	0	0	0	0	0	0.64	0	0
0	0	0	0	0	0	0.55	0	0
0	0	0	0	0	0	0.45	0	0
0	0	0	0	0	0	0.45	0	0
0	0	0	0	0	0	x	0	0
0	0	0	0	0	0	0	4.7	0.08
0	0	0	0	0	0	0	3.95	0.31
0	0	0	0	0	0	0	1.73	0.31
0	0	0	0	0	0	0	1.45	1.23
0	0	0	0	0	0	0	0.95	0.15
0	0	0	0	0	0	0	x	x

Appendix H.3 *continued*

(ix.) Species delineating the separation of cluster group C from cluster groups D and E (16.79% similarity)

	A	B	C	D	E	F
Agnezia septentrionalis	0	0	6.83	0	0	0
Laticorophium baconi	0	0	1.67	0	0	0
Polycirrus sp I	0	0	1.17	0	0	0
Aphelochaeta sp SD5	0	0	0.67	0	0	0
Poecilochaetus sp	0	0	0.67	0	0	0
Aricidea (*Allia*) sp SD1	0	0	0.5	0	0	0
Ascidiacea	0	0	0.5	0	0	0
additional 20 taxa (<0.50)	0	0	x	0	0	0
Paradoneis sp SD1	0	0	0	1.07	1.67	0
Streblosoma sp SF1	0	0	0	0.57	0.33	0
Euphysa sp A	0	0	0	0.36	1	0
Rochefortia grippi	0	0	0	0.14	0.33	0
additional 14 taxa (<0.08)	0	0	0	x	x	0

(x.) Species delineating the separation of cluster group G from cluster groups H and I (20.97% similarity)

	A	B	C	D	E	F
Skenea coronadoensis	0	0	0	0	0	0
Aoroides intermedia	0	0	0	0	0	0
Chone eiffelturris	0	0	0	0	0	0
Pseudopotamilla sp	0	0	0	0	0	0
Emerita analoga	0	0	0	0	0	0
Epitonium (*Nitidiscala*) sp	0	0	0	0	0	0
Listriella melanica	0	0	0	0	0	0
Melanella rosa	0	0	0	0	0	0
Onuphis elegans	0	0	0	0	0	0
Rhepoxynius sp A	0	0	0	0	0	0
Scolelepis sp	0	0	0	0	0	0
Thorlaksonius platypus	0	0	0	0	0	0
Venerinae	0	0	0	0	0	0
Yoldia cooperii	0	0	0	0	0	0
Heptacarpus stimpsoni	0	0	0	0	0	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

G	H	I	J	K	L	M	N	O
1.25	0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0	0
0.5	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0.25	0	0	0	0	0	0	0	0
0	1	0.11	0	0	0	0	0	0

Appendix H.3 *continued*

(xi.) Species delineating the separation of cluster groups D and E (21.05% similarity)

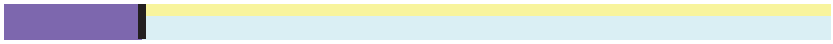
	A	B	C	D	E	F
Rhepoxynius variatus	0	0	0	1.07	0	0
Anotomastus gordiodes	0	0	0	0.14	0	0
Asteropella slatteryi	0	0	0	0.14	0	0
Hima mendica	0	0	0	0.14	0	0
Magelona pitelkai	0	0	0	0.14	0	0
Marphysa sp	0	0	0	0.14	0	0
Meiodorvillea sp SD1	0	0	0	0.14	0	0
Naineris cf *grubei*	0	0	0	0.14	0	0
Nereiphylla sp SD1	0	0	0	0.14	0	0
Pectinidae	0	0	0	0.14	0	0
Polydora narica	0	0	0	0.14	0	0
Rhepoxynius fatigans	0	0	0	0.14	0	0
Tellinidae	0	0	0	0.14	0	0
additional 33 taxa (<0.08)	0	0	0	x	0	0
Cyathura munda	0	0	0	0	2.67	0
Lumbrineridae	0	0	0	0	2.33	0
Phyllophoridae	0	0	0	0	2	0
Idarcturus allelomorphus	0	0	0	0	1.67	0
Lepidozona scrobiculata	0	0	0	0	1.67	0
Amphipholis pugetana	0	0	0	0	1	0
Discerceis granulosa	0	0	0	0	1	0
Leptochiton nexus	0	0	0	0	1	0
Ophiopsila californica	0	0	0	0	1	0
Pettiboneia sanmatiensis	0	0	0	0	1	0
Pherusa inflata	0	0	0	0	1	0
Typosyllis sp SD5	0	0	0	0	1	0
additional 31 taxa (<0.68)	0	0	0	0	x	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

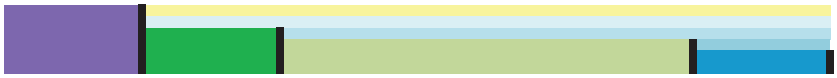
Appendix H.3 *continued*

(xii.) Species delineating the separation of cluster groups J and K (21.59% similarity)



	A	B	C	D	E	F
Nuculana leonina	0	0	0	0	0	0
Aglaophamus erectans	0	0	0	0	0	0
Podarkeopsis perkinsi	0	0	0	0	0	0
Amphioplus sp	0	0	0	0	0	0
Brisaster townsendi	0	0	0	0	0	0
Brissopsis sp LA1	0	0	0	0	0	0
Calocarides quinqueseriatus	0	0	0	0	0	0
Edwardsia profunda	0	0	0	0	0	0
Ilyarachna profunda	0	0	0	0	0	0

(xiii.) Species delineating the separation of cluster groups H and I (21.67% similarity)



	A	B	C	D	E	F
Astyris gausapata	0	0	0	0	0	0
Exacanthomysis davisi	0	0	0	0	0	0
Cirriformia sp B	0	0	0	0	0	0
Mysidopsis intii	0	0	0	0	0	0
Nereis sp	0	0	0	0	0	0
Mactridae	0	0	0	0	0	0
Alia carinata	0	0	0	0	0	0
Corophiida	0	0	0	0	0	0
Caesia fossatus	0	0	0	0	0	0
Crassispira semiinflata	0	0	0	0	0	0
Schistocomus sp	0	0	0	0	0	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0.33	0	0	0	0	0
0	0	0	0.17	0	0	0	0	0
0	0	0	0.17	0	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0
0	0	0	0	0.17	0	0	0	0

G	H	I	J	K	L	M	N	O
0	5	0	0	0	0	0	0	0
0	4	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0
0	0	2.67	0	0	0	0	0	0
0	0	0.22	0	0	0	0	0	0
0	0	0.22	0	0	0	0	0	0
0	0	0.11	0	0	0	0	0	0
0	0	0.11	0	0	0	0	0	0
0	0	0.11	0	0	0	0	0	0

Appendix H.3 *continued*

(xiv.) Species delineating the separation of cluster groups N and O (22.43% similarity)

	A	B	C	D	E	F
Foxiphalus similis	0	0	0	0	0	0
Deflexilodes norvegicus	0	0	0	0	0	0
Nicippe tumida	0	0	0	0	0	0
Brada pluribranchiata	0	0	0	0	0	0
additional 84 taxa (<0.31)	0	0	0	0	0	0
Ilyarachna acarina	0	0	0	0	0	0
Pherusa negligens	0	0	0	0	0	0
Chaetopteridae	0	0	0	0	0	0
Euchone sp	0	0	0	0	0	0
Pardaliscella symmetrica	0	0	0	0	0	0
additional 15 taxa (<0.09)	0	0	0	0	0	0

Appendix H.3 *continued*

G	H	I	J	K	L	M	N	O
0	0	0	0	0	0	0	1.18	0
0	0	0	0	0	0	0	0.65	0
0	0	0	0	0	0	0	0.6	0
0	0	0	0	0	0	0	0.55	0
0	0	0	0	0	0	0	x	0
0	0	0	0	0	0	0	0	0.23
0	0	0	0	0	0	0	0	0.23
0	0	0	0	0	0	0	0	0.15
0	0	0	0	0	0	0	0	0.15
0	0	0	0	0	0	0	0	0.15
0	0	0	0	0	0	0	0	x

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