

Assessing the ecosystem impact of scallop bottom culture through a community analysis and trophic modelling approach

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Table S1. Comparison of species comprising the different model compartments for the steady-state models for Sechura Bay in 1996 (after Taylor et al. 2008*) and 2010

Functional group	1996	2010
2. Macroalgae	<i>Caulerpa</i> sp. (99.4%), <i>Rhodomenia</i> sp. (0.6%)	<i>Caulerpa</i> sp. (96.1%), <i>Chondracanthus chamissoi</i> (1.6%), <i>Rhodomenia</i> sp. (1.3%), <i>Rhodophyta</i> (0.4%), <i>Ulva fasciata</i> (0.2%), <i>Codium fragile</i> (0.2%), <i>Gratelopia doriphora</i> (0.1%), <i>Ulva</i> sp. (0.1%)
5. Scallops	<i>Argopecten purpuratus</i>	<i>Argopecten purpuratus</i>
6. Sea urchins	<i>Arbacia</i> sp. (98.3%), <i>Tetrapigus niger</i> (1.7%)	<i>Encope</i> sp. (54.9%), <i>Arbacea spatuligera</i> (45.1%)
7. Herbivorous gastropods	<i>Aplysia</i> sp. (51.2%), <i>Littorina</i> sp. (21.3%), <i>Scurria</i> sp. (10.7%), <i>Astrea buschii</i> (8.4%), <i>Tegula atra</i> (5.0%), <i>Tegula verrucosa</i> (1.1%), <i>Chiton</i> sp. (0.6%), <i>Tegula</i> sp. (0.5%), <i>Anachis</i> sp. (0.5%), <i>Mitrella</i> sp. (0.3%), <i>Columbella</i> sp. (0.2%)	<i>Aplysia juliana</i> (32.1%), <i>Tegula picta</i> (55.9%), <i>Mitrella</i> sp. (6.9%), <i>Chiton</i> sp. (2.6%), <i>Mitra swainsonii</i> (1.6%), <i>Anachis</i> sp. (0.9%)
8. Benthic detritivores	<i>Clypeasteroidea</i> (35.8%), <i>Pagurus</i> sp. (21.5%), <i>Brandothuria</i> sp. (7.7%), <i>Turritella broderipiana</i> (4.7%), <i>Ophiuroidea</i> (3.5%), <i>Majidae</i> (3.3%), <i>Eurypanopeus</i> sp. (1.7%), <i>Dissodactylus</i> sp. (1.2%), <i>Litopenaeus</i> sp., <i>Farfantepenaeus californiensis</i> , <i>Penaeus</i> sp.	<i>Cycloxanthops sexdecimdentatus</i> (18.0%), <i>Hepatus chiliensis</i> (15.8%), <i>Holothuria</i> sp. (15.2%), <i>Crepidula</i> sp. (10.6%), <i>Inachoides microhynchus</i> (8.5%), <i>Dromia</i> sp. (8.1%), <i>Turritella broderipiana</i> (6.7%), <i>Acanthonix petiverii</i> (5.0%), <i>Gammarus</i> sp. (3.0%), <i>Pleuroncodes monodon</i> (2.5%), <i>Petrochirus californiensis</i> (1.7%), <i>Panopeus</i> sp. (1.5%), <i>Pilumnoides</i> sp. (1.2%), <i>Ophiuroidea</i> (0.6%), <i>Microphrys platysoma</i> (0.6%), <i>Dardanus</i> sp. (0.4%), <i>Euripanopeus</i> sp. (0.3%), <i>Mursia gaudichaudii</i> (0.2%), <i>Pachycheles</i> sp. (0.1%), <i>Crucibulum monticulus</i> (0.1%), <i>Alpheus</i> sp. (0.1%), <i>Crepidatella</i> sp. (0.0%), <i>Petrolisthes</i> sp. (0.0%)
9. Miscellaneous filter feeders	<i>Actinia</i> sp. (61.6%), <i>Tagelus</i> sp. (26.7%), <i>Chione</i> sp. (5.8%), <i>Halodakra subtrigona</i> (3.4%), <i>Glycimeris</i> sp. (2.2%), <i>Terebra purdyae</i> (0.3%)	<i>Tagelus dombeii</i> (77.9%), <i>Transennella pannosa</i> (15.0%), <i>Porifera</i> (6.6%), <i>Pennatulacea</i> (0.3%), <i>Cnidaria</i> (0.1%), <i>Megabalanus</i> sp. (0.1%)
10. Predatory gastropods	<i>Sinum cymba</i> (45.5%), <i>Thais chocolata</i> (26.2%), <i>Bursa</i> sp. (9.6%), <i>Priene</i> sp. (7.8%), <i>Thais kiosquiformis</i> (3.7%), <i>Hexaplex brassica</i> (3.5%), <i>Thais haemastoma</i> (1.6%), <i>Bursa ventricosa</i> (1.3%), <i>Bursa nana</i> (0.5%)	<i>Bursa ventricosa</i> (42.7%), <i>Stramonita chocolata</i> (32.9%), <i>Sinum cymba</i> (11.3%), <i>Conus regularis</i> (5.5%), <i>Ocenebra buxea</i> (2.8%), <i>Hexaplex brassica</i> (2.5%), <i>Conus patricius</i> (2.1%)
11. Small carnivores	<i>Crassilabrum</i> sp. (54.4%), <i>Polinices uber</i> (26.4%), <i>Solenosteira fusiformes</i> (8.9%), <i>Triumphis distorta</i> (5.5%), <i>Natica unifasciata</i> (1.4%), <i>Nassencoarius</i> sp. (1.2%), <i>Prunum</i> sp. (1.1%), <i>Oliva</i> sp. (1.0%)	<i>Solenosteira gatesi</i> (46.0%), <i>Solenosteira fusiformes</i> (37.8%), <i>Prunum curtum</i> (10.1%), <i>Polinices uber</i> (4.0%), <i>Nassarius</i> sp. (1.0%), <i>Nassarius gayi</i> (1.0%), <i>Pseudosquillopsis</i> sp. (0.1%), <i>Ephitonium</i> sp. (0.0%)
12. Predatory crabs	<i>Cancer porteri</i> (94.2%), <i>Callinectes arcuatus</i> (4.2%), <i>Callinectes toxotes</i> (1.6%)	<i>Portunus asper</i> (77.7%), <i>Arenaeus mexicanus</i> (22.3%)
13. Octopods	<i>Octopus mimus</i>	<i>Octopus mimus</i>

*Taylor MH, Wolff M, Vadas F, Yamashiro C (2008) Trophic and environmental drivers of the Sechura Bay Ecosystem (Peru) over an ENSO cycle. Helgol Mar Res 62(Suppl 1):15–32

Table S2. List of taxonomic groups (family level) used for rank-log abundance and ABC plots. Groups are listed alphabetically, with biomass and abundance values (standardized per m² by dividing by the number of sampling stations) for both years (1996 vs. 2010) and respective ranks. A minus indicates absence of this group in the respective year

Species	Biomass		Abundance					
	1996		2010		1996		2010	
	Weight	Rank	Weight	Rank	N°	Rank	N°	Rank
Actiniidae	7.1572	7	-	-	0.0423	28	-	-
Aethridae	-	-	2.2369	7	-	-	0.0484	23
Alpheidae	0.0410	35	0.0073	34	0.0423	29	0.0081	32
Aplysiidae	8.9754	5	1.0055	18	0.1409	18	0.0081	33
Arbaciidae	24.4640	1	1.6382	12	1.0704	7	0.0242	28
Balanidae	-	-	0.0050	35	-	-	0.0081	36
Buccinidae	0.9920	20	13.3848	2	0.0986	21	1.1371	6
Bursidae	5.1568	10	33.6194	1	0.2254	16	1.7581	4
Calappidae	-	-	0.0243	30	-	-	0.0081	37
Calyptraeidae	-	-	1.5126	14	-	-	1.5403	5
Cancellariidae	0.0458	34	-	-	0.0563	26	-	-
Cancridae	7.1452	8	-	-	0.1409	19	-	-
Chitonidae	0.1065	31	0.0812	28	0.3380	14	0.7419	9
Columbellidae	0.1779	27	0.2452	25	3.7183	2	0.5565	11
Conidae	-	-	5.9812	4	-	-	0.0161	30
Diogenidae	-	-	0.2925	24	-	-	0.7581	8
Dromiidae	-	-	1.1412	16	-	-	0.0565	21
Epialtidae	0.0135	39	0.7077	21	0.0423	27	0.6048	10
Epitoniidae	-	-	0.0017	36	-	-	0.0081	35
Gammaridae	0.0251	37	0.4267	22	0.3240	14	19.0726	1
Hiatellidae	0.2580	26	-	-	0.5916	9	-	-
Holothuriidae	2.6192	15	2.1564	9	0.0563	25	0.0403	24
Inachoididae	0.0207	38	-	-	0.3380	13	-	-
Littorinidae	3.7285	11	-	-	0.0141	37	-	-
Lottiidae	1.8852	16	-	-	1.5070	5	-	-
Majidae	1.1351	19	1.2897	15	42.2817	1	3.3307	3
Marginellidae	0.1252	29	1.5895	13	0.0704	24	0.9194	7
Mellitidae	12.18	4	1.9939	10	0.0141	35	0.0242	29
Mitridae	-	-	0.0515	29	-	-	0.0323	25
Munididae	-	-	0.3578	23	-	-	0.1855	16
Muricidae	21.7728	3	2.2034	8	0.5070	11	0.0565	22
Nassariidae	0.1338	28	0.3075	23	0.2817	15	0.4677	13
Naticidae	23.6870	2	9.5321	3	0.5493	10	0.1613	17
Neoleptonidae	0.3916	25	-	-	0.0141	36	-	-
Olvidae	0.1107	30	-	-	0.0141	38	-	-
Ophiactidae	0.0028	40	-	-	0.0704	23	-	-
Ophiuroidea	1.2009	18	0.0826	27	0.0282	32	0.0968	20
Paguridae	7.3066	6	-	-	0.1690	17	-	-
Parasquillidae	-	-	0.0182	32	-	-	0.0323	27
Pilumnoididae	0.0493	33	0.1702	26	0.1127	20	0.4677	14
Pinnotheridae	0.5487	23	-	-	0.6620	8	-	-
Porcellanidae	0.0593	32	0.0173	33	3.0704	3	0.0323	26
Portunidae	0.4423	24	1.01	17	0.0423	30	0.0968	19
Pseudolividae	0.6134	22	-	-	0.0423	31	-	-
Ranellidae	3.7125	12	0.0188	31	0.0704	22	0.0081	34
Solecurtidae	3.0989	13	4.0498	5	1.1972	6	0.4758	12
Terebridae	0.0293	36	-	-	0.0141	39	-	-
Turbinidae	2.6252	14	1.7505	11	1.6620	4	0.1936	15
Turritellidae	1.7242	17	0.9434	19	0.0282	33	0.0161	31
Veneridae	0.6787	21	0.7780	20	0.0141	34	0.1129	18
Xanthidae	7.0147	9	2.8049	6	0.3803	12	4.0323	2

Table S3. Results of the SIMPER analysis testing for the effect of year, listing the average contribution of each group to overall dissimilarity (contr), the respective standard deviation of contribution (sd), the ratio of average to standard deviation of contribution (ratio), the average biomasses of any group in each compared treatment (av.B (1996), av.B (2010), standardized per m² by dividing by the number of sampling stations), and the cumulative contribution of each group to overall dissimilarity, scaled to percentages (cumsum). Please note that all calculations (except for biomass) were done on fourth-root transformed data. Overall dissimilarity: 74.96%

	contr	sd	ratio	av.B (1996)	av.B (2010)	cumsum
Caulerpaceae	0.10788	0.090426	1.1931	311.7267	437.6201	0.1439
Pectinidae	0.07967	0.079836	0.9979	20.8725	147.3884	0.2502
Bursidae	0.05499	0.060431	0.9099	5.1568	33.6194	0.3236
Xanthidae	0.03863	0.033988	1.1365	7.0147	2.8049	0.3751
Buccinidae	0.03826	0.045189	0.8466	0.9920	13.3848	0.4261
Arbaciidae	0.03209	0.058973	0.5442	24.4639	1.6382	0.4690
Naticidae	0.02909	0.049465	0.5881	23.6870	9.5321	0.5078
Majidae	0.02645	0.023194	1.1402	1.1351	1.2897	0.5430
Paguridae	0.02613	0.032546	0.8030	7.3066	0.0000	0.5779
Muricidae	0.02251	0.051187	0.4398	21.7728	2.2034	0.6079
Rhodymeniaceae	0.01731	0.040221	0.4304	1.9179	5.8635	0.6310
Epiplatidae	0.01615	0.022000	0.7339	0.0135	0.7077	0.6526
Mellitidae	0.01557	0.047221	0.3296	12.1800	1.9939	0.6733
Marginellidae	0.01505	0.028621	0.5258	0.1252	1.5895	0.6934
Turbinidae	0.01480	0.032340	0.4575	2.6252	1.7505	0.7132
Littorinidae	0.01366	0.024030	0.5682	3.7285	0.0000	0.7314
Gammaridae	0.01349	0.021185	0.6367	0.0251	0.4267	0.7494
Solecurtidae	0.01279	0.040096	0.3189	3.0989	4.0498	0.7664
Portunidae	0.01080	0.029905	0.3611	0.4423	1.0100	0.7808
Cancridae	0.01068	0.032063	0.3331	7.1452	0.0000	0.7951
Aplysiidae	0.01027	0.033559	0.3059	8.9754	1.0055	0.8088
Diogenidae	0.00963	0.018356	0.5247	0.0000	0.2925	0.8216
Chitonidae	0.00924	0.014532	0.6357	0.1065	0.0812	0.8340
Gigartinae	0.00911	0.028229	0.3228	0.0000	7.1987	0.8461
Pilumnoididae	0.00799	0.014480	0.5514	0.0493	0.1702	0.8568
Columbellidae	0.00784	0.016896	0.4637	0.1779	0.2452	0.8672
Nassariidae	0.00761	0.018821	0.4042	0.1338	0.3075	0.8774
Calyptraeidae	0.00684	0.019631	0.3485	0.0000	1.5126	0.8865
Ophiuroidea	0.00672	0.020342	0.3304	1.2009	0.0826	0.8955
Holothuriidae	0.00638	0.035491	0.1798	2.6192	2.1564	0.9040
Turritellidae	0.00561	0.023486	0.2388	1.7242	0.9434	0.9114
Actiniidae	0.00552	0.032048	0.1722	7.1572	0.0000	0.9188
Aethridae	0.00513	0.025113	0.2041	0.0000	2.2369	0.9256
Munididae	0.00465	0.022729	0.2044	0.0000	0.3578	0.9318
Dromiidae	0.00428	0.017657	0.2423	0.0000	1.1412	0.9375
Pinnotheridae	0.00423	0.016125	0.2622	0.5487	0.0000	0.9432
Veneridae	0.00406	0.020320	0.1999	0.6787	0.7780	0.9486
Lottiidae	0.00402	0.017578	0.2288	1.8852	0.0000	0.9540
Neoleptonidae	0.00357	0.019315	0.1849	0.3916	0.0000	0.9587
Halymenciaceae	0.00331	0.015743	0.2101	0.0000	0.5290	0.9632
Pseudolividae	0.00326	0.019920	0.1636	0.6134	0.0000	0.9675
Codiaceae	0.00314	0.014314	0.2194	0.0000	0.9200	0.9717
Olvidae	0.00287	0.010837	0.2651	0.1107	0.0000	0.9755
Conidae	0.00284	0.021732	0.1306	0.0000	5.9812	0.9793
Ranellidae	0.00274	0.015282	0.1795	3.7125	0.0188	0.9830
Porcellanidae	0.00259	0.010210	0.2541	0.0593	0.0173	0.9864
Alpheidae	0.00191	0.008993	0.2122	0.0410	0.0073	0.9890
Mitridae	0.00158	0.010155	0.1557	0.0000	0.0515	0.9911
Cancellariidae	0.00153	0.009508	0.1613	0.0458	0.0000	0.9931
Hiattellidae	0.00127	0.010722	0.1188	0.2580	0.0000	0.9948
Parasquillidae	0.00112	0.005945	0.1877	0.0000	0.0182	0.9963
Terebridae	0.00094	0.008082	0.1168	0.0293	0.0000	0.9976
Inachoididae	0.00054	0.004492	0.1200	0.0207	0.0000	0.9983
Ophiactidae	0.00041	0.003480	0.1188	0.0028	0.0000	0.9989
Calappidae	0.00037	0.003924	0.0945	0.0000	0.0243	0.9993
Balanidae	0.00029	0.003068	0.0941	0.0000	0.0050	0.9997
Epitoniidae	0.00020	0.002150	0.0943	0.0000	0.0017	1.0000