

Supplementary materials for:

Beyond a single patch: local and regional processes explain diversity patterns in a seagrass epifaunal metacommunity

Supplementary figures

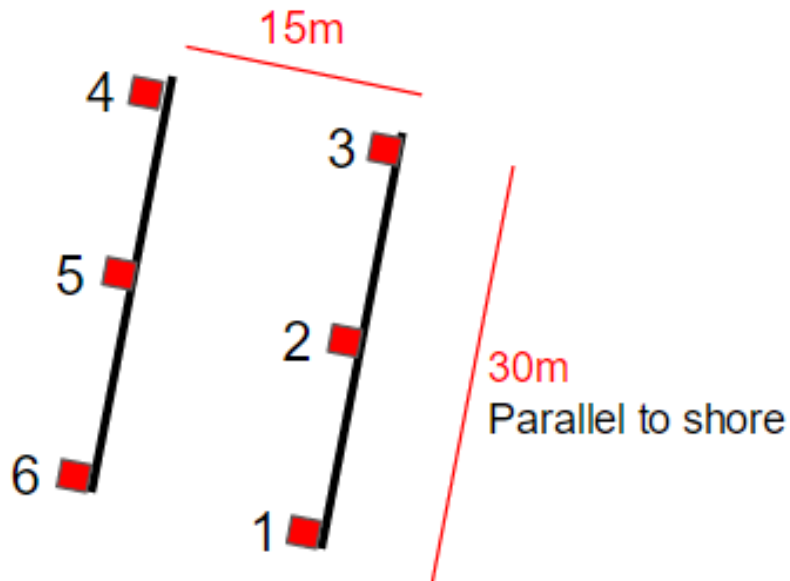


Figure S1. Schematic diagram of the field sampling scheme. Black lines represent transect lines, and red boxes represent 0.25 x 0.25 m quadrats.



Figure S2. Heatmap showing presence or absence of all species in the biodiversity survey at all 17 sites. Black cells indicate that the taxon was present at a given site. This figure includes all taxa in the study, including those that were excluded from the JDSM.

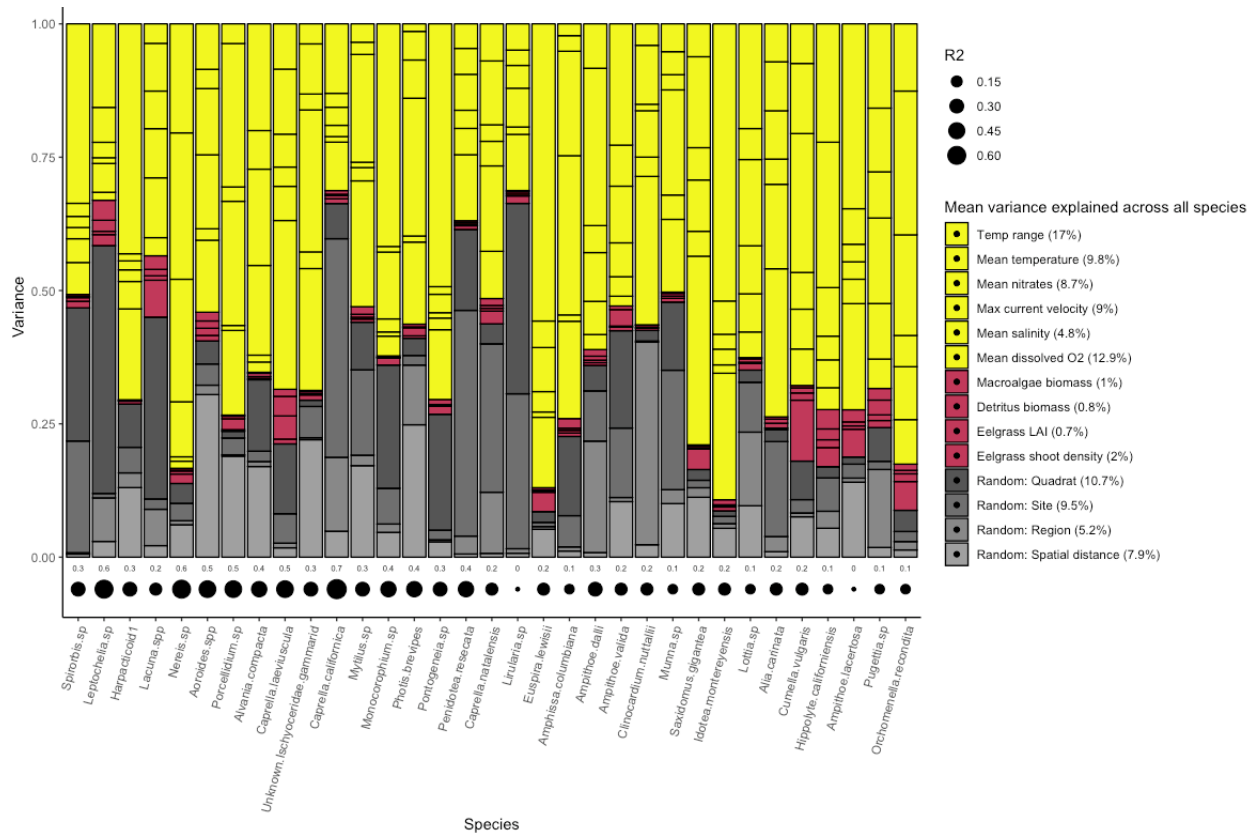


Figure S3. Unadjusted variance in abundance explained by each individual species distribution model in the JDSM. Black circles represent the model fit (pseudo R^2) for a given taxon. The mean % variance explained values shown in the legend are derived from the JDSM without accounting for the imperfect model fit.

Supplementary tables

Table S1. Summary of traditional biodiversity metrics for each site. Sea anemones and nudibranchs were observed at some sites during dive surveys, but were not sampled with our sampling scheme, and therefore are excluded from these metrics.

Site abbrev	Full site name	Region	Taxonomic richness	Raw abundance	Effective diversity (Hill number)
CB	Cabbage Island	Gulf Islands	18	2112	5.0
GB	Gallagher Bay	Gulf Islands	11	2239	4.3
JB	James Bay	Gulf Islands	22	3522	7.1
LH	Lyall Harbour	Gulf Islands	15	2259	6.6
SS	Sidney Spit	Gulf Islands	10	740	6.6
DC	Dodger Channel	Barkley Sound	21	1168	11.8
RB	Robber's Passage	Barkley Sound	17	1590	8.8
SA	Sarita	Barkley Sound	17	924	6.8
DU	Ducking	Clayoquot Sound	21	1168	11.8
EB	Elbow Bank	Clayoquot Sound	21	4812	8.5
IN	Indian	Clayoquot Sound	16	1803	7.5
TN	Triquet North	Central coast	35	1919	12.8
TB	Triquet Bay	Central coast	31	2223	8.6
CI	Choked I5	Central coast	39	3762	10.6
CS	Choked Sandspit	Central coast	31	4505	7.9
HL	Head of Louscoone	Haida Gwaii	9	16743	1.3
RA	Ramsay Island	Haida Gwaii	14	934	8.6

Table S2. A list of seagrass-associated epifaunal invertebrate taxa included in the joint species distribution model. Pseudo R^2 and Root-mean-square-error were calculated from four-fold cross-validation. The top twenty most abundant species across the study region (as shown in Fig. 5a-d) are in bold.

Species name	Broad taxonomic group	Pseudo R^2	RMSE
<i>Alia carinata</i>	Gastropod (snail)	0.19	1.81
<i>Alvania compacta</i>	Gastropod (snail)	0.36	49.84
<i>Amphissa columbiana</i>	Gastropod (snail)	0.05	2.59
<i>Euspira lewisii</i>	Gastropod (snail)	0.23	3.99
<i>Lacuna</i> spp. (<i>L. variegata</i> and <i>L. vincta</i>)	Gastropod (snail)	0.00	40.95
<i>Lirularia</i> sp.	Gastropod (snail)	0.12	5.36
<i>Lottia</i> sp.	Gastropod (limpet)	0.25	1.55
<i>Clinocardium nuttallii</i>	Bivalve	0.34	2.39
<i>Mytilus</i> sp.	Bivalve	0.24	19.62
<i>Saxidomus gigantea</i>	Bivalve	0.28	2.44
<i>Spirorbis</i> sp.	Polychaete	0.61	5425.94
<i>Nereis</i> sp.	Polychaete	0.27	41.56
<i>Ampithoe dalli</i>	Gammarid amphipod	0.03	2.99
<i>Ampithoe lacertosa</i>	Gammarid amphipod	0.19	2.35
<i>Ampithoe valida</i>	Gammarid amphipod	0.46	4.45
<i>Aoroides</i> spp.	Gammarid amphipod	0.39	68.2
<i>Monocorophium</i> sp. (likely <i>M. insidiosum</i>)	Gammarid amphipod	0.11	14.47
<i>Orchomenella recondita</i>	Gammarid amphipod	0.43	0.58
<i>Photis brevipes</i>	Gammarid amphipod	0.26	11.75
<i>Pontogeneia rostrata</i>	Gammarid amphipod	0.33	8.55
<i>Ischyrocerus</i> sp. (likely <i>I. anguipes</i>)	Gammarid amphipod	0.68	44.75
<i>Caprella californica</i>	Caprellid amphipod	0.45	16.92
<i>Caprella laeviuscula</i>	Caprellid amphipod	0.17	28.03
<i>Caprella natalensis</i>	Caprellid amphipod	0.20	7.67
<i>Cumella vulgaris</i>	Cumacean	0.55	1.50
<i>Leptochelia</i> sp.	Tanaid	0.52	501.39
<i>Porcellidium</i> sp.	Copepod	0.28	23.30
Harpacticoid 1	Copepod	0.19	140.47
<i>Idotea montereyensis</i>	Isopod	0.37	3.44
<i>Penidotea resecata</i>	Isopod	0.11	4.92
<i>Pugettia</i> sp.	Brachyuran crab	0.09	0.84
<i>Hippolyte californiensis</i>	Caridean shrimp	0.07	1.17

Table S3. A list of rare taxa that were counted in the biodiversity survey but excluded from the JDSM to avoid over-inflating the importance of environmental and spatial variables.

Species name	Broad taxonomic group
<i>Anoplodactylus viridintestinalis</i>	Pycnogonid (“sea spider”)
<i>Harmothoe imbricata</i>	Gastropod (snail)
<i>Exogone</i> sp.	Polychaete worm
<i>Dorvillea longicornis</i>	Polychaete worm
<i>Glycinde armigera</i>	Polychaete worm
<i>Grandidierella japonica</i>	Amphipod
<i>Jassa marmorata</i>	Amphipod
<i>Nebalia gerkenae</i>	Leptostracan
<i>Ceradocus spinicauda</i>	Amphipod
<i>Neoamphitrite robusta</i>	Polychaete worm
<i>Littorina</i> sp.	Gastropod (snail)

Table S4. Summary of site-level biometric and environmental data. Values represent the mean values taken across 6 quadrats per site.

Site	LAI	SST (mean) °C	SST (range) °C	Nitrates (mean)	Salinity (mean) ppt	Dissolved O2 (mean)	Eelgrass shoot density (shoots m ⁻²)	Detritus biomass (g per 0.025 m ² quadrat)	Macroalgae biomass (g per 0.025 m ² quadrat)
CB	0.46	8.20	1.19	13.80	33.92	34.11	82.67	0.93	0.20
DC	0.41	8.36	3.12	22.08	33.39	107.63	616.00	0.59	0.60
DK	0.46	10.05	5.28	3.94	32.26	284.81	152.00	3.61	4.80
EB	0.43	9.26	3.38	9.11	32.38	246.56	317.33	3.04	5.55
GB	0.32	8.66	1.67	18.13	32.92	44.94	98.67	0.46	14.15
HL	1.06	9.84	9.46	2.83	31.99	288.91	165.33	0.09	0.00
IN	0.03	8.55	2.75	18.94	32.85	164.08	266.67	0.96	1.23
CI	0.30	7.57	1.40	24.25	33.41	121.71	77.33	0.00	7.17
JB	0.55	8.36	1.27	15.38	33.63	35.27	56.00	0.22	7.01
LH	0.65	8.99	1.77	17.85	32.92	59.65	48.00	0.07	0.33
RA	0.81	6.25	1.76	29.16	33.89	119.25	456.00	0.00	0.51
RB	0.39	8.22	2.25	19.05	33.78	74.74	120.00	1.35	0.21
CS	0.57	7.57	1.40	24.25	33.41	121.71	141.33	2.77	1.53
SA	0.31	8.01	1.63	20.91	33.91	69.17	88.00	0.25	0.31
SS	0.68	7.57	1.84	28.74	33.96	94.17	82.67	0.18	0.00
TB	0.61	7.31	1.27	26.05	33.61	103.79	205.33	0.00	0.00
TN	0.25	7.31	1.27	26.05	33.61	103.79	66.67	0.00	0.00