

## Effects of habitat on fish abundance and species composition on temperate rocky reefs

Dane F. Parsons\*, Iain M. Suthers, Derrick O. Cruz, James A. Smith

\*Corresponding author: danefparsons@gmail.com

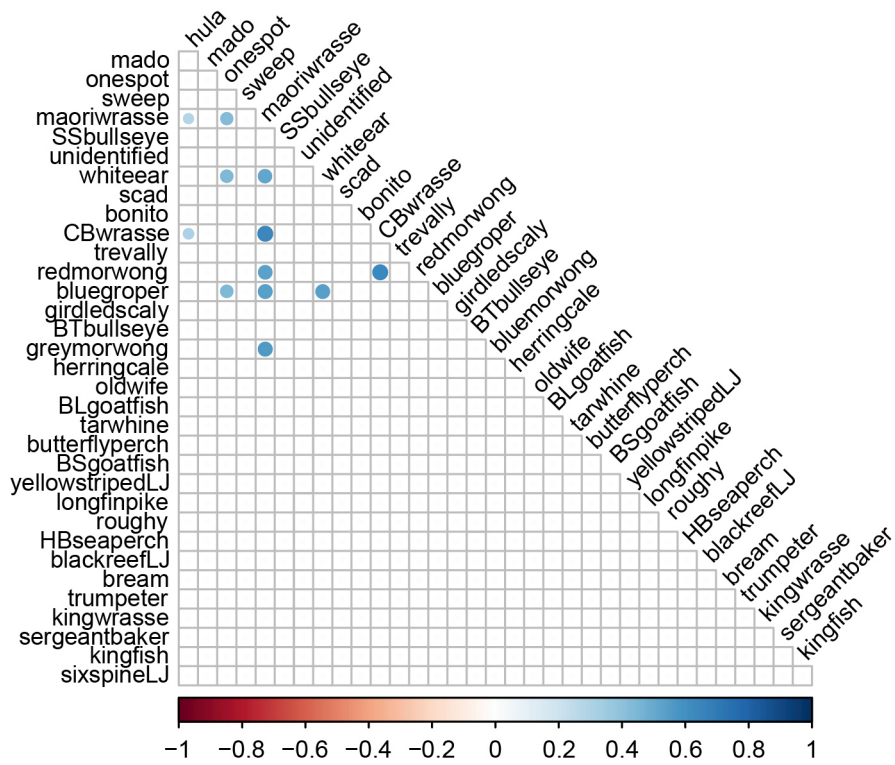
*Marine Ecology Progress Series 561: 155–171 (2016)*

**Table S1.** Locations and average water depths of the 37 sampled reef sites, named using local fishing terminology. Abundance is the sum of all fish recorded in all 10 drops per site. Richness is the total number of fish species identified in all 10 drops per site. Sites are ordered by latitude (north to south).

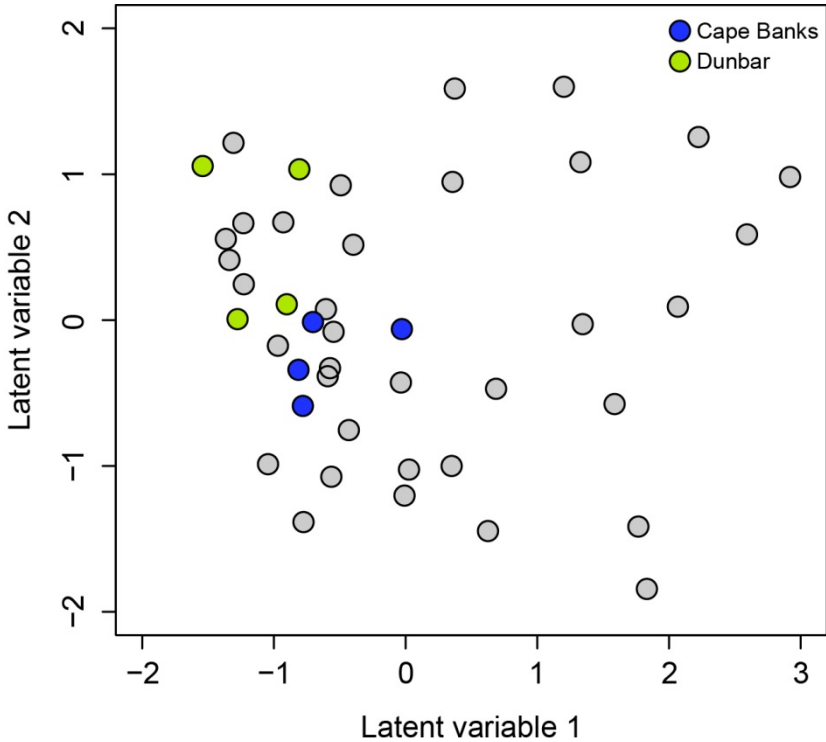
Site num.	Site Name	Latitude	Longitude	Av. depth (m)	Abund.	Richness
1	Boultons	33° 36.474'S	151° 22.399'E	39.6	16	10
2	Reggies	33° 38.040'S	151° 21.686'E	38.1	17	6
3	Newport Shallow	33° 39.668'S	151° 20.366'E	19.8	20	5
4	Bongin Shallow	33° 40.741'S	151° 19.215'E	10.9	97	12
5	Dave's Reef	33° 40.913'S	151° 20.274'E	31.1	91	9
6	Narrabeen Head	33° 41.839'S	151° 19.295'E	13.4	177	10
7	Long Reef Wreck	33° 42.771'S	151° 19.467'E	24.6	100	17
8	White Rock	33° 43.823'S	151° 18.744'E	19.3	166	14
9	Long Reef - The Wall	33° 44.098'S	151° 19.775'E	16.5	600	9
10	Long Reef Wide	33° 44.399'S	151° 20.527'E	30.8	587	13
11	O'Shanassy	33° 45.202'S	151° 19.660'E	14.0	968	20
12	Dee Why Wide	33° 45.761'S	151° 18.910'E	17.1	279	14
13	Mugs Reef	33° 46.595'S	151° 19.125'E	32.2	314	11
14	Whale	33° 47.070'S	151° 22.480'E	46.3	491	13
15	Queenscliff	33° 47.447'S	151° 17.714'E	11.2	802	11
16	Three Buoys	33° 47.458'S	151° 20.957'E	52.4	86	14
17	North Head	33° 49.144'S	151° 18.185'E	17.9	59	12
18	Colours	33° 49.599'S	151° 19.312'E	42.2	121	7
19	South Head	33° 50.202'S	151° 16.981'E	9.8	284	14
20	Dunbar	33° 50.944'S	151° 17.654'E	22.7	322	15
21	Rosa Gully	33° 51.739'S	151° 17.063'E	11.2	1040	14
22	Stink Pipe	33° 53.287'S	151° 17.242'E	11.1	120	13
23	Bronte	33° 54.538'S	151° 16.442'E	10.8	86	7
24	Coogee Wide	33° 55.438'S	151° 17.211'E	44.6	98	8
25	Wedding Cake	33° 55.471'S	151° 15.990'E	10.5	647	21
26	Trag Grounds	33° 56.141'S	151° 16.386'E	23.7	1442	24
27	Deadman's	33° 57.782'S	151° 15.984'E	17.5	726	16
28	Little Bay	33° 59.048'S	151° 15.593'E	29.9	196	15
29	Cape Banks	33° 59.922'S	151° 15.112'E	16.1	498	12
30	Kurnell	34° 0.436'S	151° 13.940'E	18.4	89	14
31	Kurnell Wide	34° 1.485'S	151° 14.346'E	38.4	63	14
32	Lighthouse	34° 2.149'S	151° 13.602'E	18.8	134	14
33	Spot X	34° 2.903'S	151° 13.305'E	46.0	29	7
34	Xanadu	34° 2.936'S	151° 12.096'E	26.1	231	14
35	Osbourne Shoals	34° 3.532'S	151° 11.218'E	12.2	153	12
36	Jibbon	34° 4.525'S	151° 10.877'E	23.0	184	16
37	Barrens Hut	34° 5.396'S	151° 10.220'E	21.7	31	8

**Table S2.** Results of the GLMMs testing the importance of habitat factors to abundance for the four most commonly occurring fish species (see Table 2). Significant parameter estimates ( $P < 0.05$ ) are shaded grey. ‘Comp. scale’ = habitat complexity, at the measured scales small (S), medium (M) and large (L). Complexity was a categorical factor (0-4) and each level of the factor (‘Comp 1’ etc.) is compared to areas of lowest complexity ‘Comp 0’. *Conn100* and *Conn250* are connectivity variables at the 100 m and 250 m scales, and *BioTotal* is the percentage cover of biogenic substrate (Table 1). AIC and delta-AIC values are reported, and the most likely model for each response variable has lowest AIC (bold) and  $\Delta AIC = 0$ .

	Comp. scale	Depth	Temp	Conn100	Conn250	Comp 1	Comp 2	Comp 3	Comp 4	Bio-Total	Depth* BioTotal	BioTotal* Conn250	AIC	ΔAIC	%Devi- ance
Australian mado	i) S	0.048	-0.155	0.025	0.028	0.822	0.892	0.480	0.718	0.102	-0.001	-0.000	<b>911.1</b>	0	15.6
	ii) M	0.062	-0.149	0.024	0.034	0.252	0.579	0.628	0.791	0.116	-0.150	-0.001	911.7	0.6	9.5
	iii) L	0.031	-0.158	0.023	0.041	0.016	0.027	-0.059	-1.186	0.106	-0.001	-0.001	912.0	0.9	9.5
Southern maori wrasse	i) S	-0.044	-0.126	0.001	0.032	0.681	0.545	0.068	-0.029	0.018	0.000	-0.000	<b>770.4</b>	0	12.4
	ii) M	-0.037	-0.113	0.002	0.037	0.425	0.134	-0.112	-1.067	0.024	0.000	-0.000	772.8	2.4	10.3
	iii) L	-0.042	-0.108	0.001	0.037	0.291	-0.052	0.337	-0.877	0.023	0.000	-0.000	775.6	5.2	9.0
White-ear	i) S	0.029	0.158	-0.001	0.024	1.293	1.631	2.440	2.267	0.050	-0.000	-0.000	<b>599.1</b>	0	23.1
	ii) M	0.040	0.160	-0.000	0.037	0.777	1.497	1.043	1.176	0.062	-0.001	-0.001	614.7	15.6	12.4
	iii) L	0.020	0.090	0.002	0.032	0.883	1.350	1.033	1.369	0.048	-0.000	-0.000	615.2	16.1	12.9
Eastern hula fish	iii) S	-0.293	0.233	-0.007	0.014	6.195	7.238	8.486	11.720	-0.041	0.002	0.000	<b>535.8</b>	0	40.1
	ii) M	-0.356	0.038	-0.007	0.079	1.098	4.398	4.655	6.849	0.004	0.003	-0.001	537.3	1.5	37.1
	iii) L	-0.432	0.012	0.003	0.083	3.644	4.046	5.735	2.302	-0.041	0.004	-0.001	537.2	1.4	25.4



**Fig. S1.** Residual correlation matrix from the latent variable model (LVM), showing the significant correlations between fish species after accounting for the habitat variables (see Fig. 5 in main article).



**Fig. S2.** LVM unconstrained ordination of sites, including the two reference sites Dunbar and Cape Banks (each reference site was sampled four times). The closer the four surveys are for each reference site, the more consistent species composition was between sampling days.