

The following supplement accompanies the article

## Seascape habitat patchiness and hydrodynamics explain genetic structuring of kelp populations

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**Table S1** Sampling locations.

Site	Longitude	Latitude
West 1	42°58'29"S	147°20'15"E
West 2	42°59'11"S	147°19'42"E
West 3	43°00'01"S	147°19'41"E
West 4	43°00'28"S	147°19'46"E
West 5	43°01'03"S	147°19'47"E
West 6	43°02'20"S	147°20'16"E
East 1	42°58'43"S	147°23'41"E
East 2	42°59'39"S	147°23'55"E
East 3	42°59'54"S	147°23'52"E
East 4	43°00'30"S	147°23'57"E
East 5	43°02'15"S	147°24'15"E
East 6	43°02'19"S	147°24'30"E
East 7	43°02'46"S	147°24'28"E
South	43°03'57"S	147°21'36"E

**Table S2** Frequencies of null alleles estimated using the ENA method of Chapuis and Estoup (2007).

Sample	<i>Lco102</i>	<i>Lco146</i>	<i>Lco154</i>	<i>Lco199</i>	<i>Lco208</i>	<i>Lco217</i>	<i>Lco251</i>
East1	0	0	0.050	0	0	0.051	0.070
East2	0.037	0.130	0.035	0.106	0	0.050	0
East3	0.066	0	0	0	0.001	0	0.001
East4	0	0	0	0.105	0	0.081	0.001
East5	0	0.079	0	0	0.032	0.011	0.079
East6	0	0.167	0	0	0.133	0.107	0
East7	0.065	0	0.007	0	0.004	0.137	0
South	0.095	0	0	0	0	0.127	0
West1	0.022	0.047	0	0	0	0	0
West2	0.077	0	0.004	0	0	0.087	0
West3	0.155	0	0	0.046	0	0.001	0
West4	0.103	0	0	0	0.022	0	0.075
West5	0.050	0	0.109	0	0.062	0.024	0.001
West6	0	0	0.001	0	0.080	0.064	0

**Table S3** Pairwise  $F_{ST}$  estimates among localities (lower diagonal) with corresponding exact test  $P$ -values (above the diagonal).

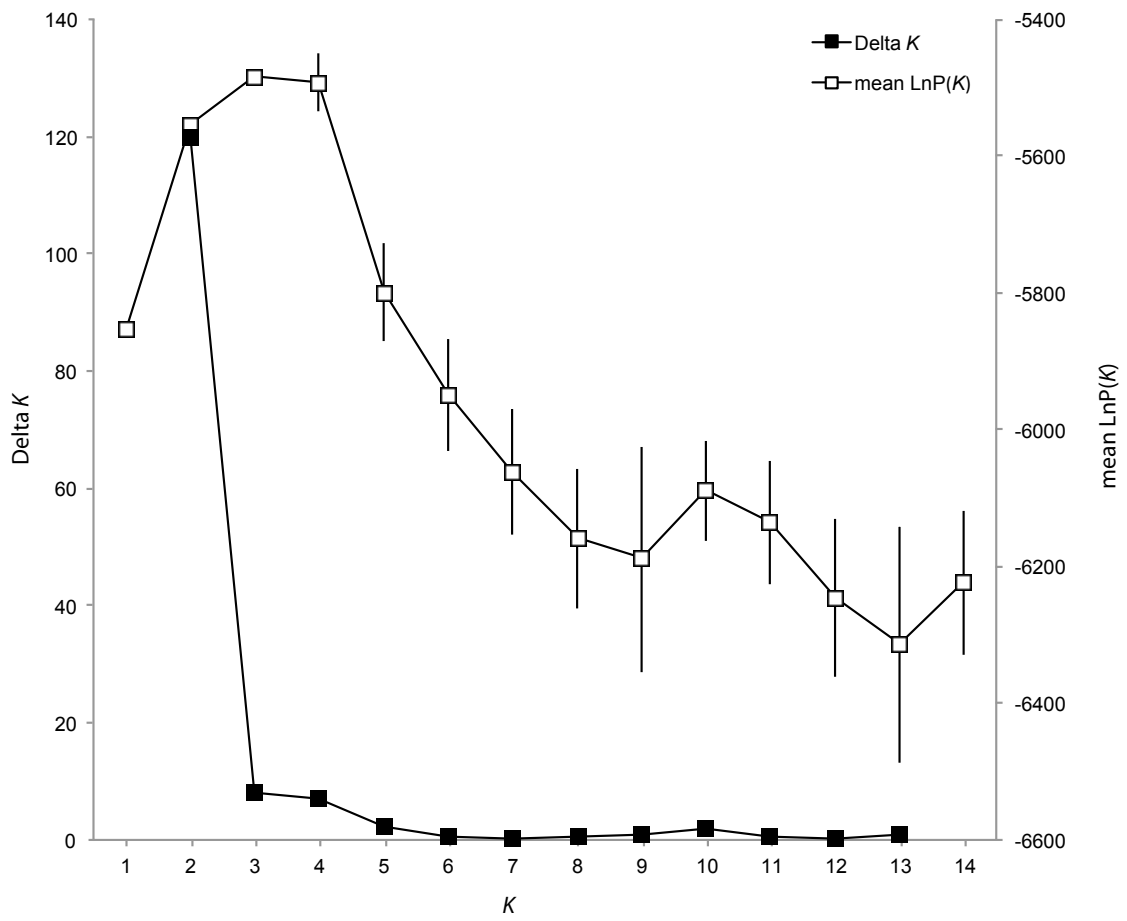
	West 1	West 2	West 3	West 4	West 5	West 6	East 1	East 2	East 3	East 4	East 5	East 6	East 7	South
West 1		0.001***	0.084 <sup>ns</sup>	0.001***	0.086 <sup>ns</sup>	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
West 2	0.023*		0.001***	0.035*	0.091 <sup>ns</sup>	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
West 3	0.011 <sup>ns</sup>	0.028*		0.001***	0.105 <sup>ns</sup>	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
West 4	0.049**	0.012 <sup>ns</sup>	0.044**		0.042*	0.006**	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
West 5	0.009 <sup>ns</sup>	0.009 <sup>ns</sup>	0.007 <sup>ns</sup>	0.011 <sup>ns</sup>		0.008**	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
West 6	0.069**	0.032**	0.040**	0.022*	0.017*		0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
East 1	0.165**	0.166**	0.095**	0.132**	0.124**	0.134**		0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
East 2	0.175**	0.148**	0.100**	0.121**	0.109**	0.084**	0.050**		0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
East 3	0.428**	0.377**	0.359**	0.351**	0.335**	0.280**	0.314**	0.184**		0.001***	0.001***	0.001***	0.001***	0.001***
East 4	0.323**	0.276**	0.265**	0.221**	0.233**	0.175**	0.196**	0.116**	0.106**		0.001***	0.001***	0.001***	0.001***
East 5	0.268**	0.248**	0.209**	0.220**	0.234**	0.255**	0.098**	0.217**	0.448**	0.327**		0.001***	0.001***	0.001***
East 6	0.250**	0.198**	0.194**	0.180**	0.200**	0.205**	0.150**	0.189**	0.420**	0.297**	0.056*		0.023*	0.001***
East 7	0.138**	0.100**	0.087**	0.080**	0.096**	0.107**	0.071**	0.113**	0.352**	0.233**	0.065**	0.030 <sup>ns</sup>		0.001***
South	0.038**	0.039**	0.051**	0.056**	0.041**	0.075**	0.175**	0.201**	0.429**	0.321**	0.217**	0.208**	0.111**	

Note: Significance values indicated as \*( $P < 0.05$ ) \*\*( $P < 0.01$ ), \*\*\*( $P < 0.001$ ), ns = not significant after correction for False Discovery Rate.

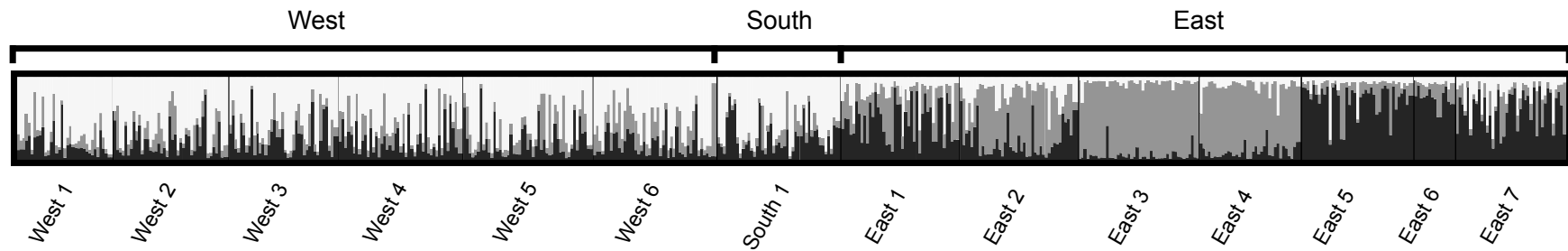
**Table S4** Probabilities of each location acting as a source of propagules for other locations, with a dispersal duration of 2 days. The top right section of the matrix displays results for northward dispersal routes and bottom left shows results for southward dispersal routes.

	West 1	West 2	West 3	West 4	West 5	West 6	East 1	East 2	East 3	East 4	East 5	East 6	East 7	South
West 1	-	0.002	0	0	0	0	0	0	0	0	0	0	0	0
West 2	0.082	-	0	0	0	0	0	0	0	0	0	0	0	0
West 3	0.017	0.013	-	0.004	0	0	0	0	0	0	0	0	0	0
West 4	0.008	0.015	0.023	-	0	0	0	0	0	0	0	0	0	0
West 5	0.008	0.021	0.004	0.002	-	0	0	0	0	0	0	0	0	0
West 6	0.006	0.004	0.013	0.048	0.008	-	0	0	0	0	0	0	0	0.011
East 1	0	0	0	0	0	0	-	0.006	0.002	0	0	0	0	0
East 2	0	0	0	0	0	0	0.063	-	0.107	0	0	0	0	0
East 3	0	0	0	0	0	0	0.051	0.604	-	0.002	0	0	0	0
East 4	0	0	0	0	0	0	0.078	0.274	0.726	-	0	0	0	0
East 5	0	0	0	0	0	0	0.004	0	0	0	-	0	0	0
East 6	0	0	0	0	0	0	0	0	0	0	0	-	0	0
East 7	0	0	0	0	0	0	0	0	0	0	0.038	0	-	0
South	0.006	0.006	0.008	0.021	0.021	0.017	0	0	0	0	0	0	0	-

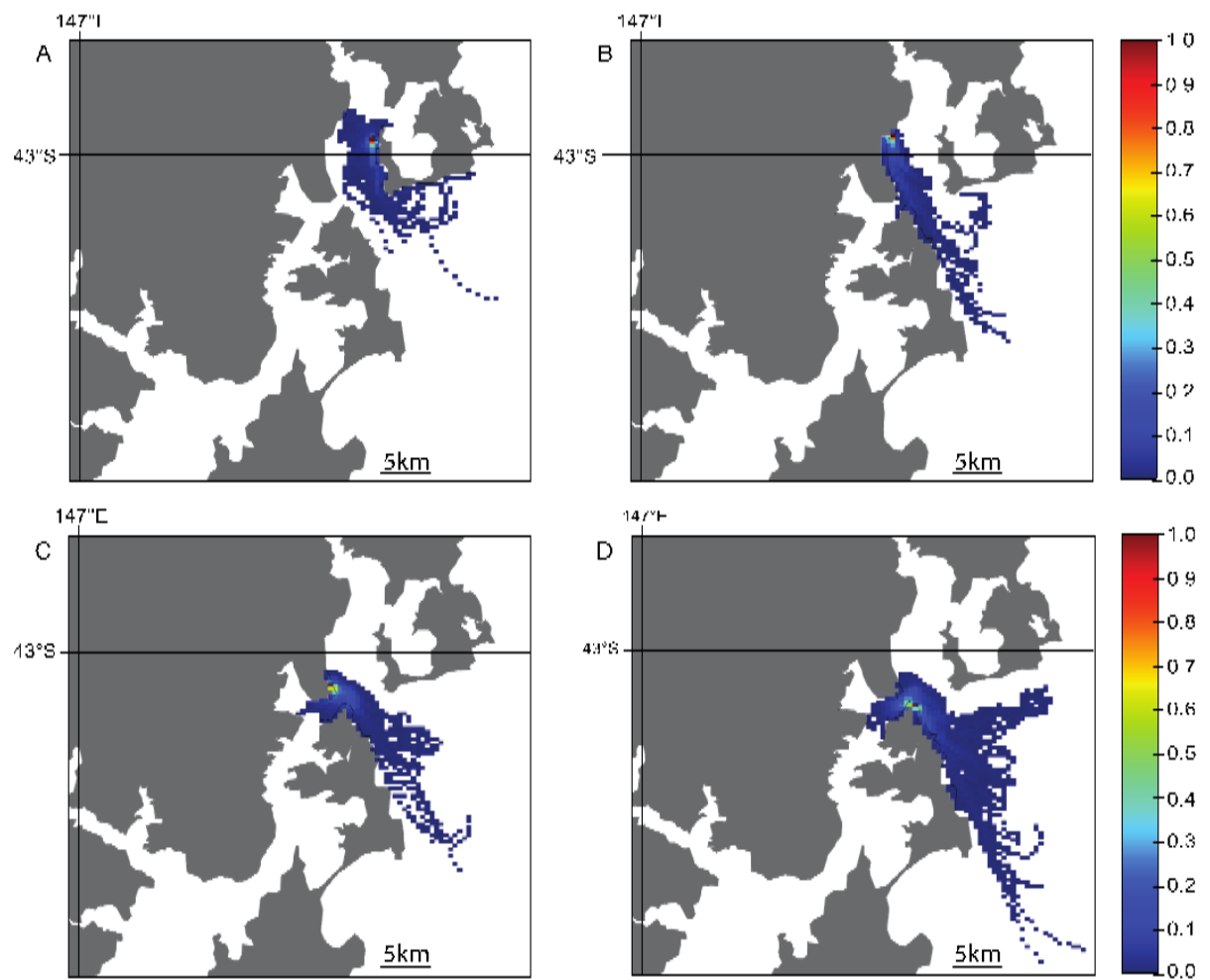
\*Note: In cases where dispersal was bidirectional, the sum of the probability of movement between sites was used in multivariate analyses.



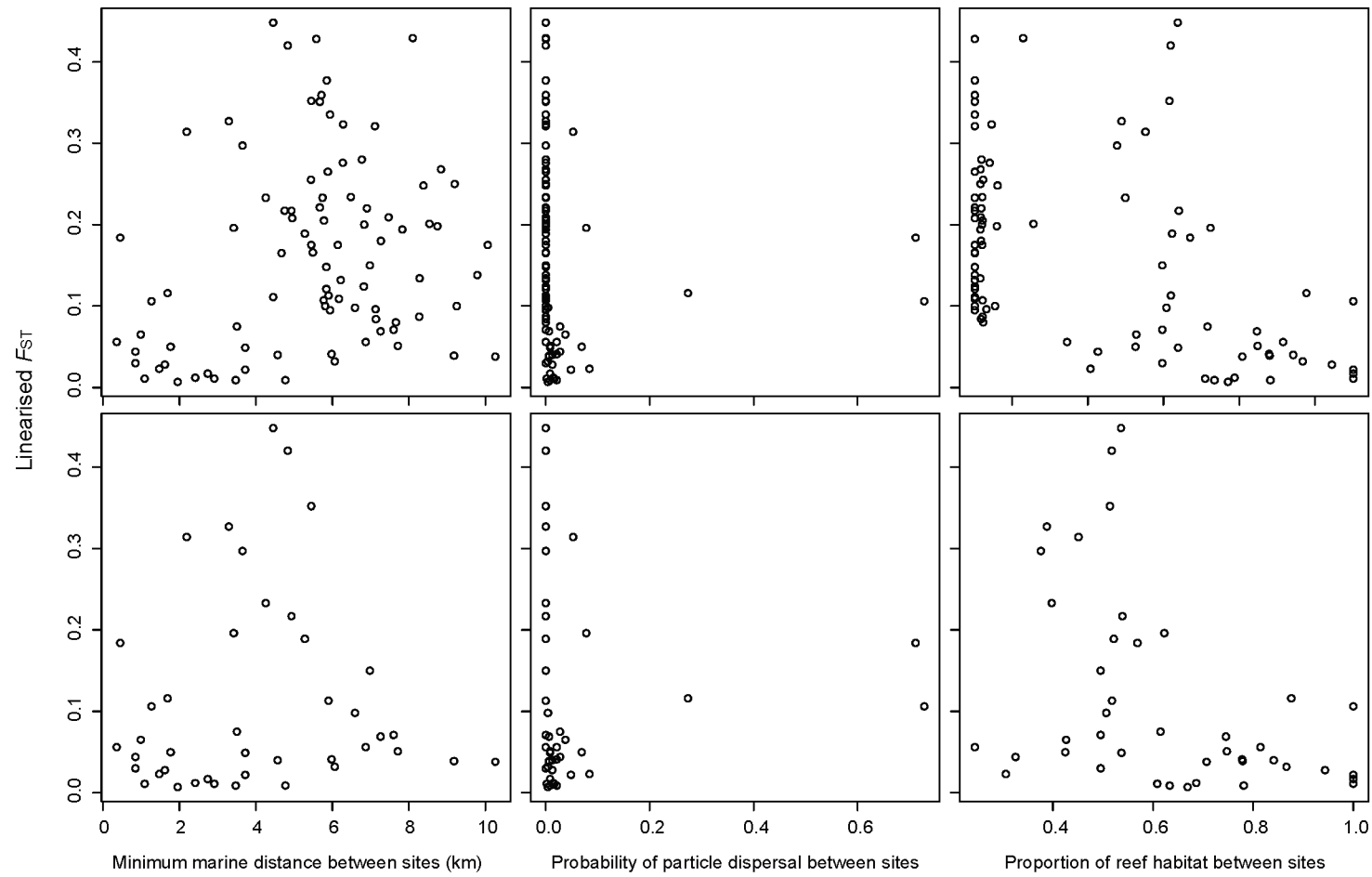
**Fig. S1** Plot of  $\Delta K$  (left axis) and mean  $\text{LnP}(K)$  (right axis,  $\pm\text{SD}$  represented by error bars) per cluster ( $K$ ), based on 20 replicates of  $K$  during STRUCTURE analysis.



**Fig. S2** Results from STRUCTURE analysis, showing  $K = 3$  clusters. Each bar represents an individual within a location, with each shade representing the coancestry coefficient of that individual belonging to a particular cluster.



**Fig. S3** Examples of Aus-Connie predicted dispersal probability of propagules after a 2-day dispersal period: A) Release site at East 1, B) Release site at West 1, C) Release site at West 6 and D) Release site at South.



**Fig. S4** Relationships between linearised  $F_{ST}$  and potential predictors of genetic structure. Top row reflects all possible site comparisons, while the bottom row shows only those comparisons within shores (but grouping “south” with western sites).