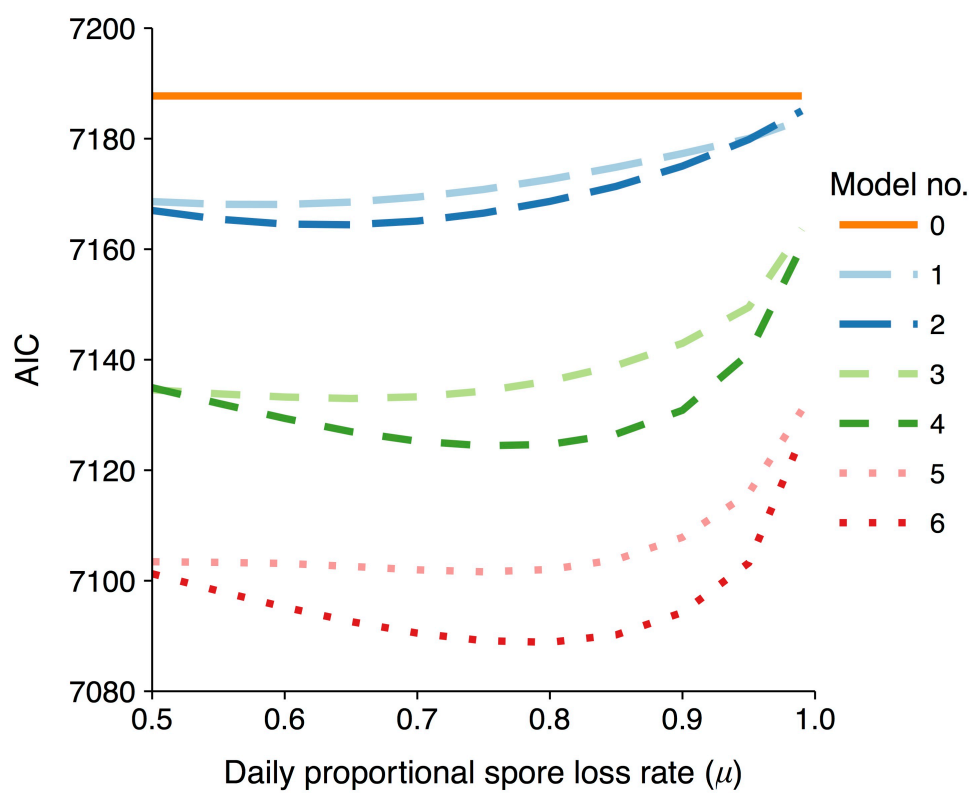


**Electronic supplementary material for:**

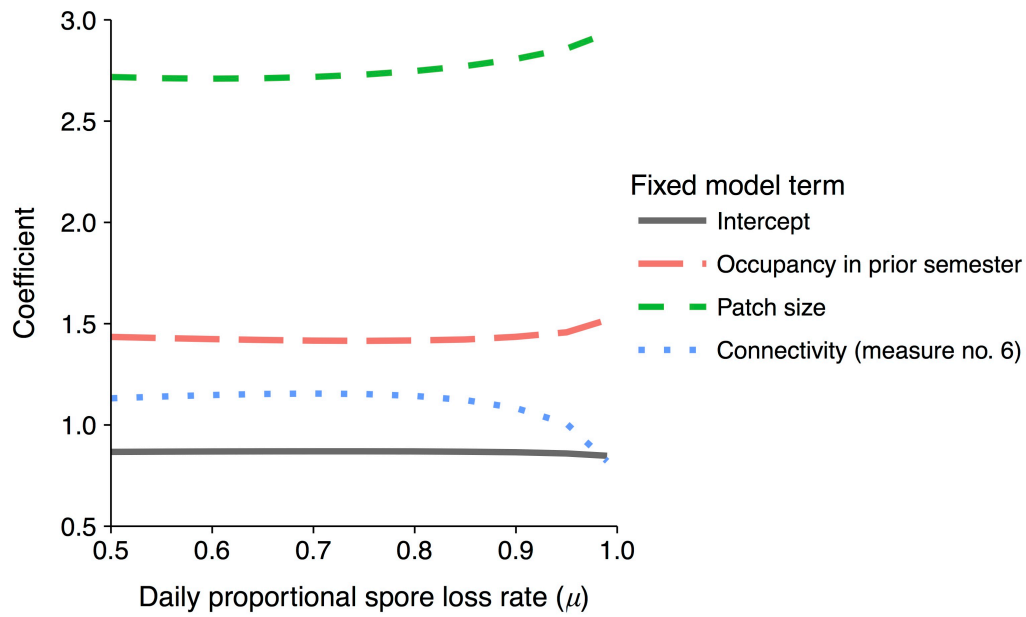
Castorani, M. C. N., Reed, D. C., Raimondi, P. T., Alberto, F., Bell, T. W.,

Cavanaugh, K. C., Siegel, D. A., &amp; Simons, R. D. Fluctuations in population

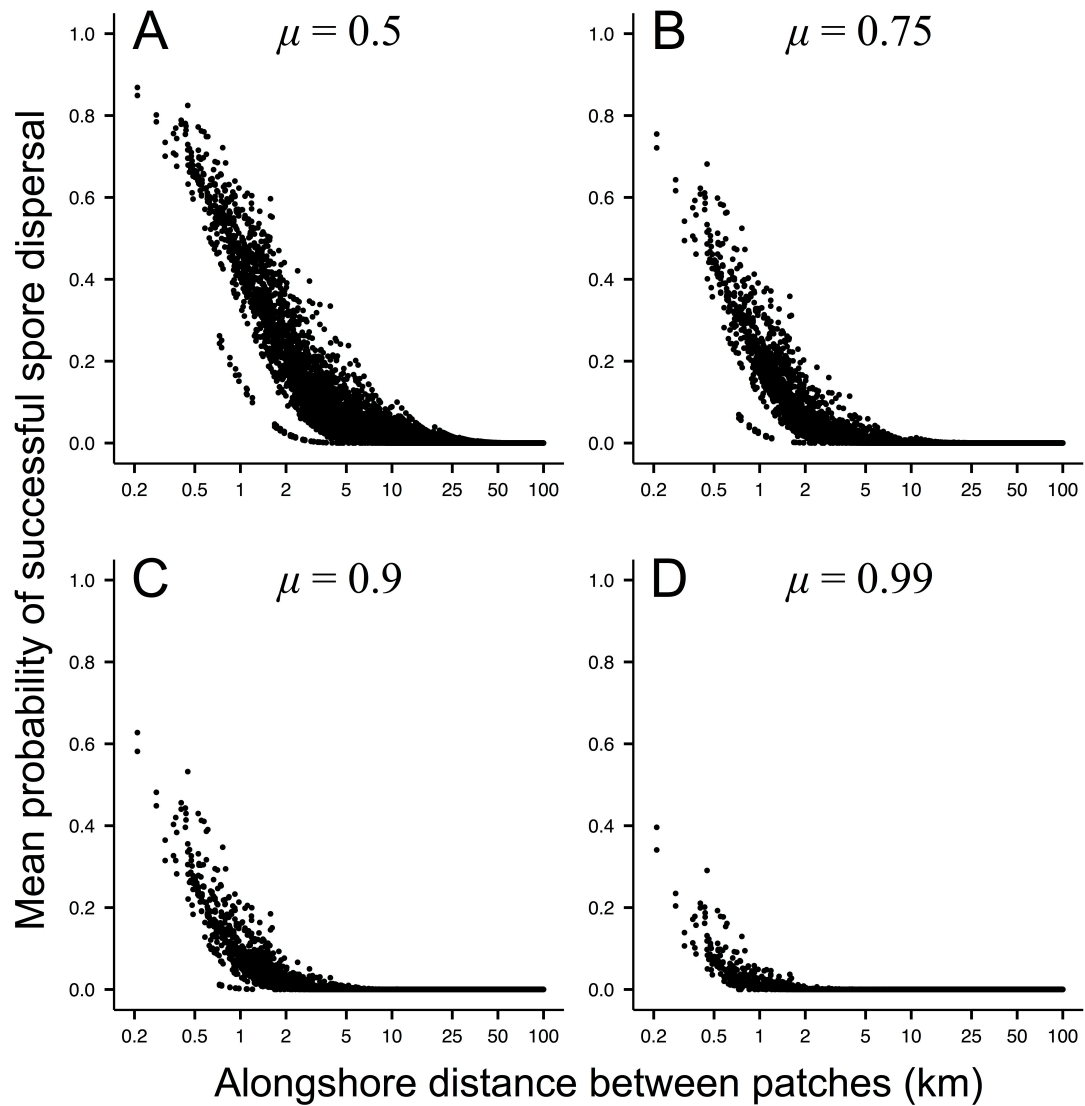
fecundity drive variation in demographic connectivity and metapopulation dynamics.

*Proc. R. Soc. B Biol. Sci.* (doi:10.1098/rspb.2016.2086)**Supplementary figures**

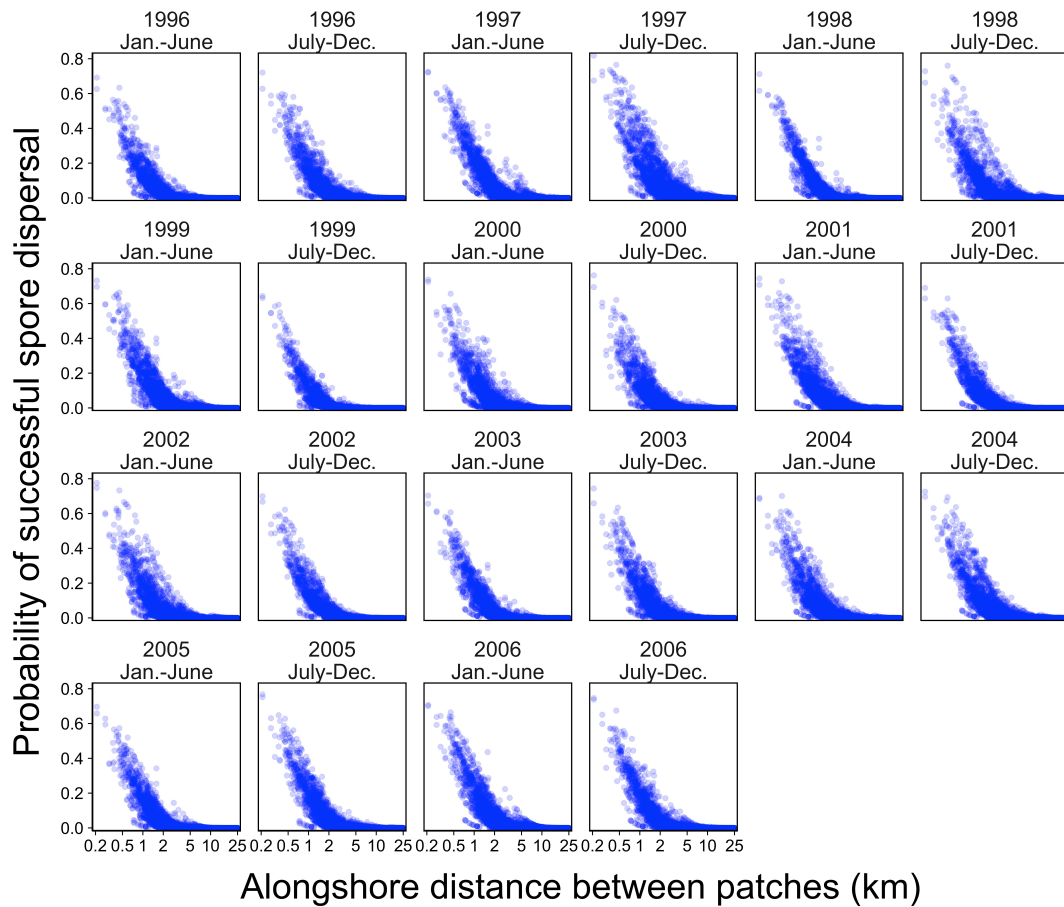
**Figure S1.** Line graph showing the relationship between variation in daily proportional spore loss rate ( $\mu$ ) and AIC values for each model (see table 1 for descriptions). Lower AIC values correspond to better model fit.



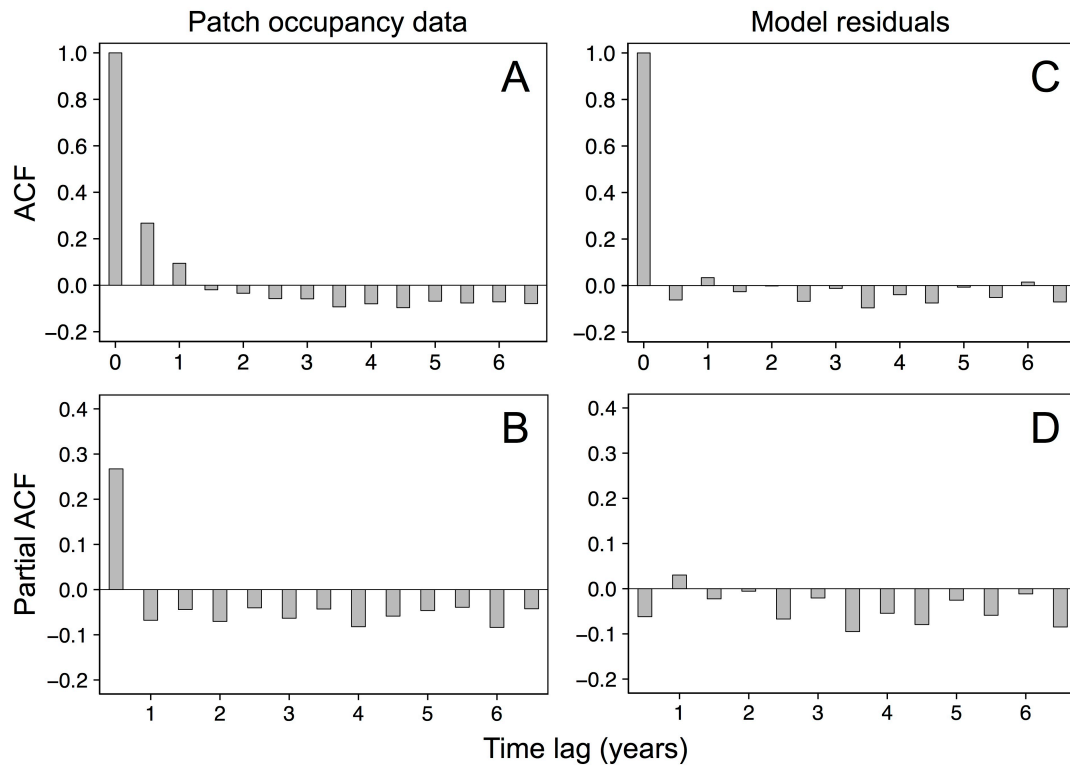
**Figure S2.** Line graph showing the relationship between variation in daily proportional spore loss rate ( $\mu$ ) and coefficients for fixed terms in the best model (no. 6; see table 1).



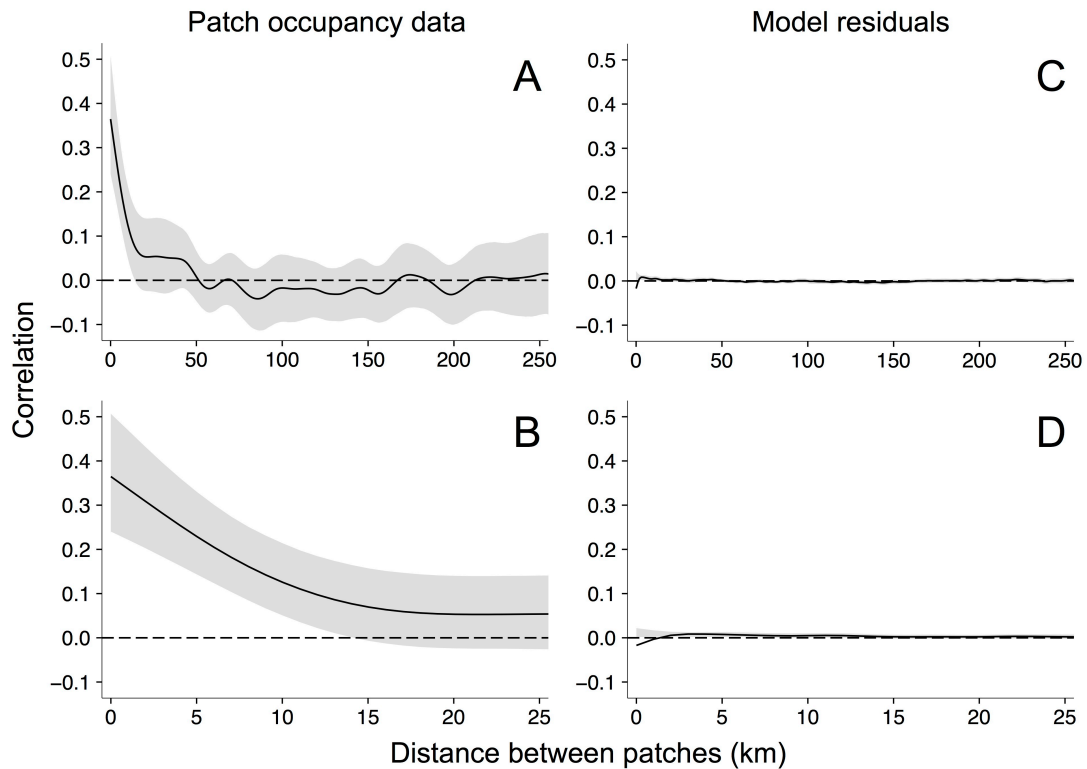
**Figure S3.** Modeled mean probabilities of successful spore dispersal as a function of the alongshore distance between the centroids of giant kelp patches and the daily proportional spore loss rate ( $\mu$ ). Points represent time-averaged (all semesters from 1996 to 2007) probabilities of successful spore dispersal between all pairs of patches separated by alongshore distances less than 100 km. Note that the x-axis is on a log scale.



**Figure S4.** Modeled probabilities of successful spore dispersal as a function of the alongshore distance between the centroids of giant kelp patches, year, and semester (separate panels). Points represent probabilities of successful spore dispersal between all pairs of patches separated by alongshore distances less than 25 km, assuming a daily proportional spore loss rate ( $\mu$ ) of 0.8. Note that the  $x$ -axis is on a log scale.



**Figure S5.** Sample autocorrelations (ACF) and partial autocorrelations (PACF), measures of temporal autocorrelation, for giant kelp patch occupancy (panels A–B) and Pearson residuals from generalized linear mixed effects models (panels C–D). Plotted autocorrelation of giant kelp patch occupancy represents the mean autocorrelation for all patches ( $n = 469$ ). In panels C–D, residuals are shown for the best model (no. 6; see table 1) but are representative of patterns of residuals from other models.



**Figure S6.** Spline correlograms, a measure of spatial autocorrelation, for giant kelp patch occupancy (panels A–B) and Pearson residuals from generalized linear mixed effects models (panels C–D). Panels A–B and C–D show the same data, respectively, on different scales of the  $x$ -axis. Correlograms of giant kelp patch occupancy represents the mean spatial autocorrelation among all semesters ( $n = 22$ ). In panels C–D, residuals are shown for the best model (no. 6; see table 1) but are representative of patterns of residuals from other models. Grey shaded areas show bootstrapped 95% confidence intervals ( $n = 1000$  randomizations). A dashed reference line is shown for a correlation of zero.