# Supporting Information

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Justification for the Chosen Model. Coral fertilization success typically exhibits a nonlinear response to sperm concentration, with maximum fertilization success at sperm concentrations ranging from 10^5 to 10^6 sperm mL^{-1} for at least six species of coral (1–3). Based on previous studies (1–3), we selected four sperm concentrations within the range of 10^5–10^6 sperm mL^{-1} to evaluate the effect of elevated pCO$_2$ on coral fertilization success. The nonlinear response of percent fertilization to sperm concentration seen in our data are representative of previously published fertilization curves within the same range of sperm concentrations (Fig. S1, black rectangle). The model selected, $\%Fert = \max\%Fert(1 - e^{-C*SC})$,

approximates the relationship between fertilization and sperm concentration that has been previously documented in the literature and is widely used in biological and physiological modeling when measuring process-oriented events relative to an asymptotic condition. In our case, the asymptotic condition is the percent fertilization at high sperm concentrations. Conversely, at lower sperm concentrations, the percent fertilization is nonlinearly increasing toward the asymptote at a decreasing rate. The proposed model reflects such a process, and thus we fit the percent fertilization at sperm concentration data to nonlinear regressions (exponential rise to maximum, two parameter), as described in *Materials and Methods*.

1. Oliver J, Babcock R (1992) Aspects of the fertilization ecology of broadcast spawning corals: Sperm dilution effects and *in situ* measurements of fertilization. *Biol Bull* 183:409–417.
2. Levitan DR, Fukami H, Jara J, Kline D, McGovern TM (2004) Mechanisms of reproductive isolation among sympatric broadcast-spawning corals of the *Montastraea annularis* species complex. *Evolution* 58:308–323.
3. Willis BL, Babcock RC, Harrison PL, Wallace CC (1997) Experimental hybridization and breeding incompatibilities within the mating systems of mass spawning reef corals. *Coral Reefs* 16:S53–S65.
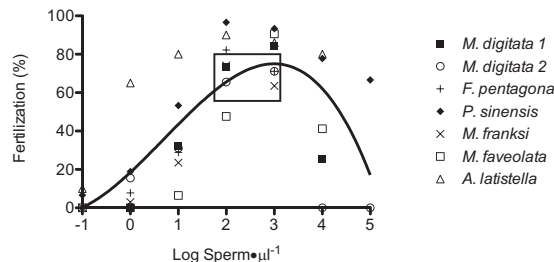
Fig. S1. Fertilization success as a function of sperm concentration (adapted from refs. 1–3). The black rectangle represents the range of sperm concentrations identified as optimal for fertilization success and the range of sperm concentrations used in the present study. *M. digitata* 1 and 2, *F. pentagona*, and *P. sinensis* are from ref. 1; *M. franski* and *M. faveolata* are from ref. 2; and *A. latistella* is from ref. 3.

Fig. S2. Individual nonlinear regressions for the three CO2 treatments: 468 μatm (*A*), 673 μatm (*B*), and 998 μatm (*C*). Open symbols represent observed data, and closed symbols represent expected data as determined by the model. In *B*, "x" represents the mean fertilization of the cell that was omitted when fitting the regression model (*Materials and Methods*). In *C*, "+" represents an outlier that was omitted from the regression (*Materials and Methods*). Regressions were fit separately for each CO_2 concentration. Parameter estimates are given in Table 1.