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Cover sheet

Title

Individual variation in marine larval-fish swimming speed and the emergence of dispersal kernels

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Table S1: Summary of ontogenetic changes in larval behavior in the swimming model. Size-based behavioral information from the literature was converted into age-based ontogenetic change in the model. When larvae were competent to settle (24 Days After Hatching), larvae swim towards reefs if they are within 4 km of a reef, otherwise exhibit behaviors in Stage 4. Behavioral data for *P. maculatus* larvae were only available for preflexion larvae (vertical distribution only) and for larvae competent to settle (settlement-stage larvae). All other behavioral data were based on *Epinephelus coioides*, which is closely related to *P. maculatus* and has similar ecological requirements by also being a primarily inshore species. During stage 1, swimming abilities are present that permit feeding, vertical migration and responses to predators by larvae, but morphological, physiological and hydrodynamic limitations result in horizontal swimming that is not sustainable over temporal and spatial scales relevant to dispersal outcomes (Leis 2006).

Stage	Egg	1 (pre-swimming)	2	3	4	Settlement
Behavior	No behavior, only egg buoyancy	Vertical distribution	Swimming, orientation, vertical distribution	Swimming, orientation, vertical distribution	Swimming, orientation, vertical distribution	Swim towards reef if within sensory zone
Age (Days After Hatching)	-27 to 0 hours	0-9 DAH	9-14 DAH	15-21 DAH	21-24 DAH	24-33 DAH

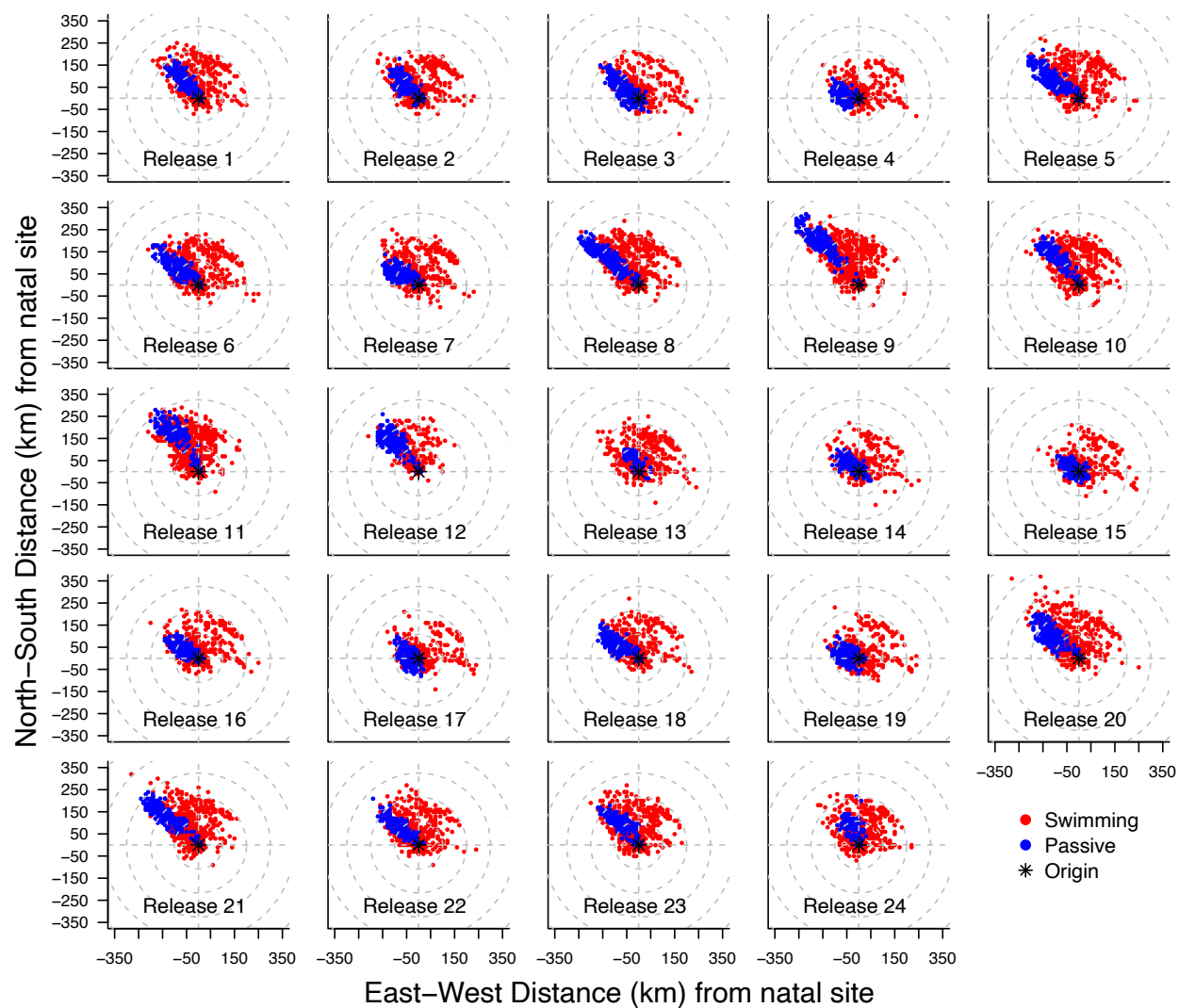


Figure S1: Distribution of settlement locations relative to the origin location for the biophysical model with (red) and without (blue) larval swimming for each Inshore release (n=24) separately.

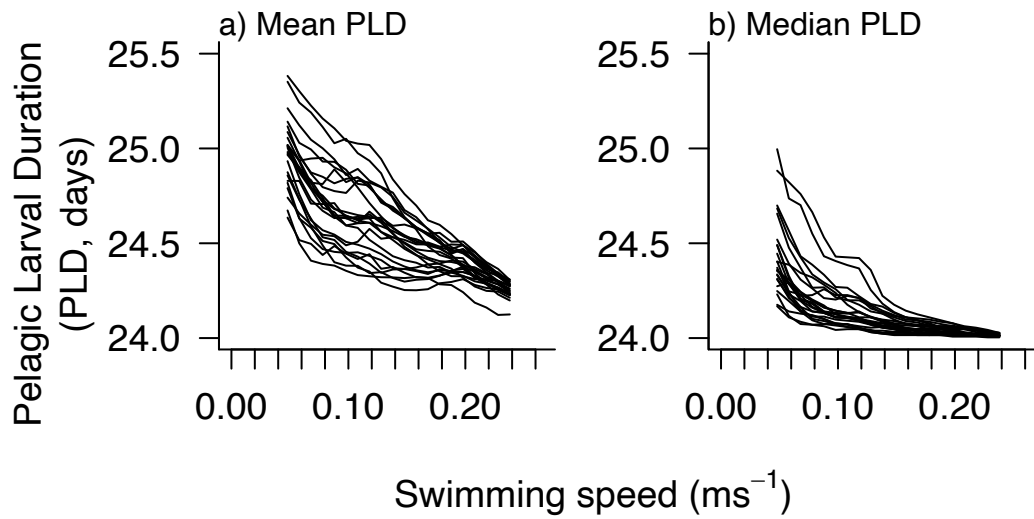
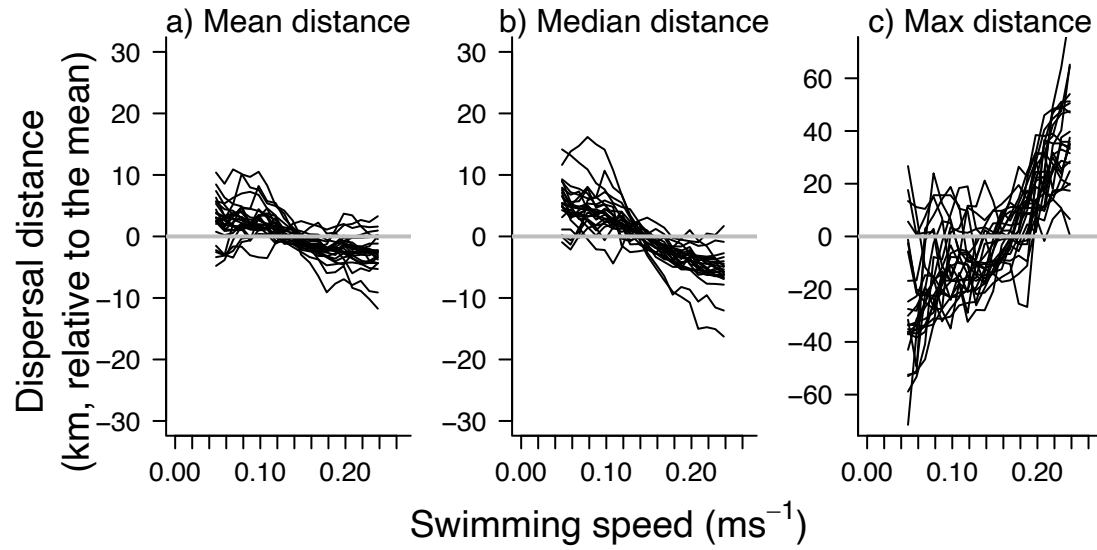


Figure S2: The relationship between discounted swimming speed (ms^{-1}) and the a) mean and b) median pelagic larval duration (PLD) for each release, using a rolling window. Each black line represents one of 24 releases over a 2 year time period. Larvae were capable of settling between day 24 and day 33.



26

27 **Figure S3:** The same as Figure 4, but for releases from the Swains. The relationship between
 28 discounted swimming speed (ms^{-1}) and the a) mean, b) median, and c) maximum mean-
 29 standardized dispersal distance for each release, using a rolling window. Each black line
 30 represents one of 24 releases over a 2 year time period. The grey line indicates the mean.

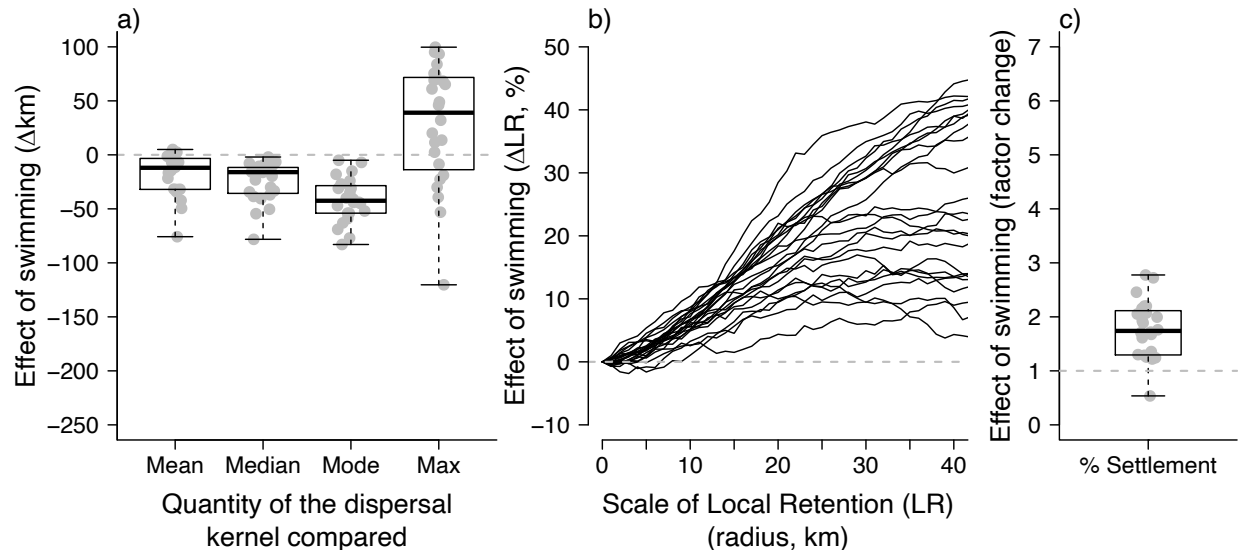
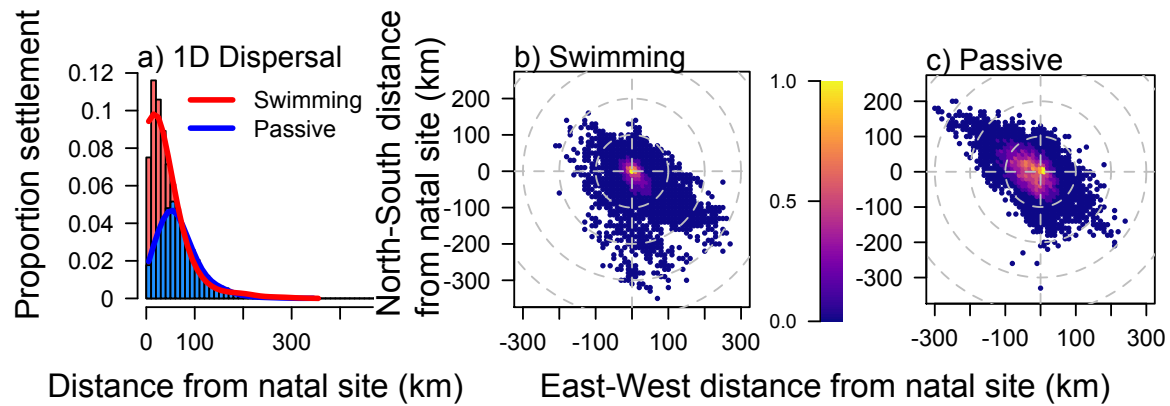


Figure S4: Same as Figure 2, but for releases for the Swains. a) The difference in the mean, median, mode, and maximum dispersal distance (Δkm) between the biophysical model with and without larval swimming. b) The difference in the percent local retention (ΔLR) for a given radius (km) around the natal site between the biophysical model with and without larval swimming. c) The factor change in % Settlement in the biophysical model with swimming relative to the model without larval swimming. Each dot or line represents one of 24 releases monthly over a 2 year time period.



39

40 **Figure S5:** Same as for Figure 3, but for releases from the Swains. a) 1-dimensional dispersal
 41 kernels for biophysical models with (red) and without (blue) larval swimming. b) 2-dimensional
 42 distribution of dispersal distances for the biophysical model with larval swimming. c) 2-
 43 dimensional distribution of dispersal distances for the biophysical model without larval
 44 swimming (passive model). In b) and c), the color scale represents the relative density of settlers
 45 in 10x10 km grid cells (proportion of settlers in each grid cell / maximum proportion of settlers
 46 in any grid cell, where proportion of settlers = number that settle / total released). Data shown
 47 here are all 24 releases from inner and mid shelf reefs in the southern GBR pooled.