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#### Title

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

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Supplementary Appendix for Burgess et al 2021 Individual variation in marine larval-fish swimming speed and the emergence of dispersal kernels. *Oikos* doi:10.1111/oik.08896

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

Stage	Egg	1 (pre-	2	3	4	Settlement
		swimming)				
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	-27 to 0	0-9 DAH	9-14 DAH	15-21	21-24	24-33
After	hours			DAH	DAH	DAH
Hatching)						



17

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<sup>-1</sup>) 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.

21



26

Figure S3: The same as Figure 4, but for releases from the Swains. The relationship between discounted swimming speed (ms<sup>-1</sup>) and the a) mean, b) median, and c) maximum mean-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 ( $\Delta$ km) between the biophysical model with and without larval swimming. b) The difference in the percent local retention ( $\Delta$ LR) 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.

31





