

### Supplemental Tables

Table S1. Relative importance of environmental covariates influencing the distribution of grouper spawning aggregations sites. Variables with a greater effect on ocean habitat suitability can be identified by larger summed Akaike weights ( $\sum w_i$ ) (Burnham & Anderson 2002). Scores range from 0-1, with 1 having the greatest influence on spawning aggregation distribution. Abbreviations are described in Table 1.

	Nassau grouper $\sum w_i$	Yellowfin grouper $\sum w_i$	Black grouper $\sum w_i$	Red hind $\sum w_i$
SST	1.0000	1.0000	1.0000	0.9968
Seasonal SST Gradients	0.9994	0.9945	1.0000	0.3488
<i>u</i>	<0.0001	0.9999	0.9885	0.9999
<i>v</i>	1.0000	0.0005	1.0000	0.9945
<i>w</i>	<0.0001	<0.0001	<0.0001	<0.0001
EKE	<0.0001	0.0019	0.0115	0.7872
Chl	<0.0001	0.0150	0.0481	0.2995

Table S2. Relative importance of environmental covariates influencing the distribution of snapper fish spawning aggregation (FSA) sites. Variables with a greater effect on ocean habitat suitability can be identified by larger summed Akaike weights ( $\sum w_i$ ). Abbreviations are described in Table 2.

	Cubera snapper $\sum w_i$	Mutton snapper $\sum w_i$	Lane snapper $\sum w_i$	Gray snapper $\sum w_i$
SST	0.9970	1.0000	1.0000	1.0000
Seasonal SST Gradients	1.0000	1.0000	0.9993	0.4300
<i>u</i>	0.1088	0.9999	1.0000	0.5814
<i>v</i>	0.9453	1.0000	0.0013	0.4831
<i>w</i>	<0.0001	<0.0001	0.0041	0.4062
EKE	0.0013	0.0559	0.0873	0.0496
Chl	0.0658	0.0558	0.0168	0.2399

### Supplemental Figures

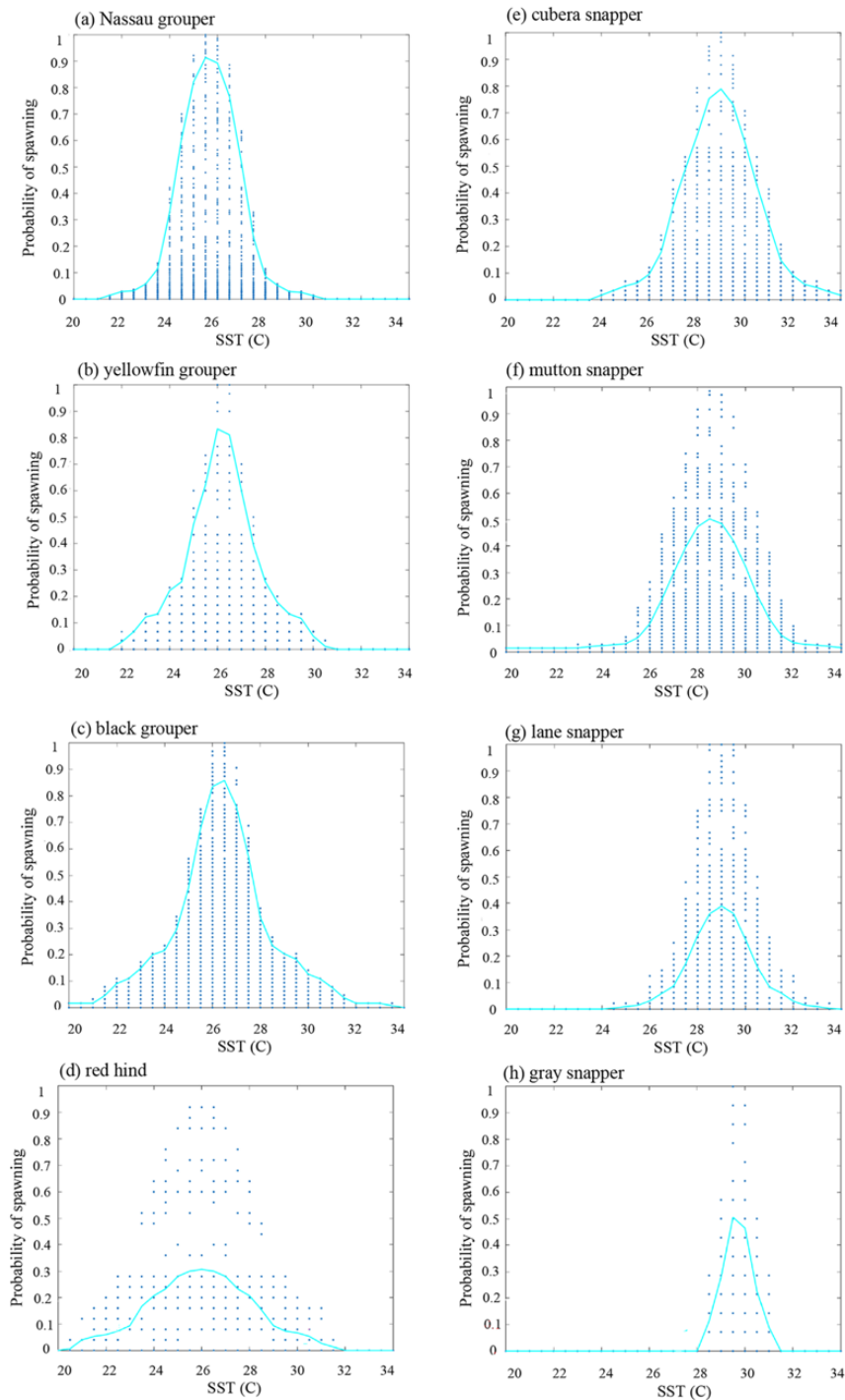


Figure S1. Spawning habitat suitability as a function of sea surface temperature (SST) based on the Non-Parametric Probability Ecological Niche (NPPEN) model. All species included in this figure had SST selected in the model of best fit. Blue dots indicate probability of spawning at a given temperature across an array of environmental conditions included in the NPPEN models for each species. Turquoise lines indicates the species' response to temperature when other environmental conditions are optimized.

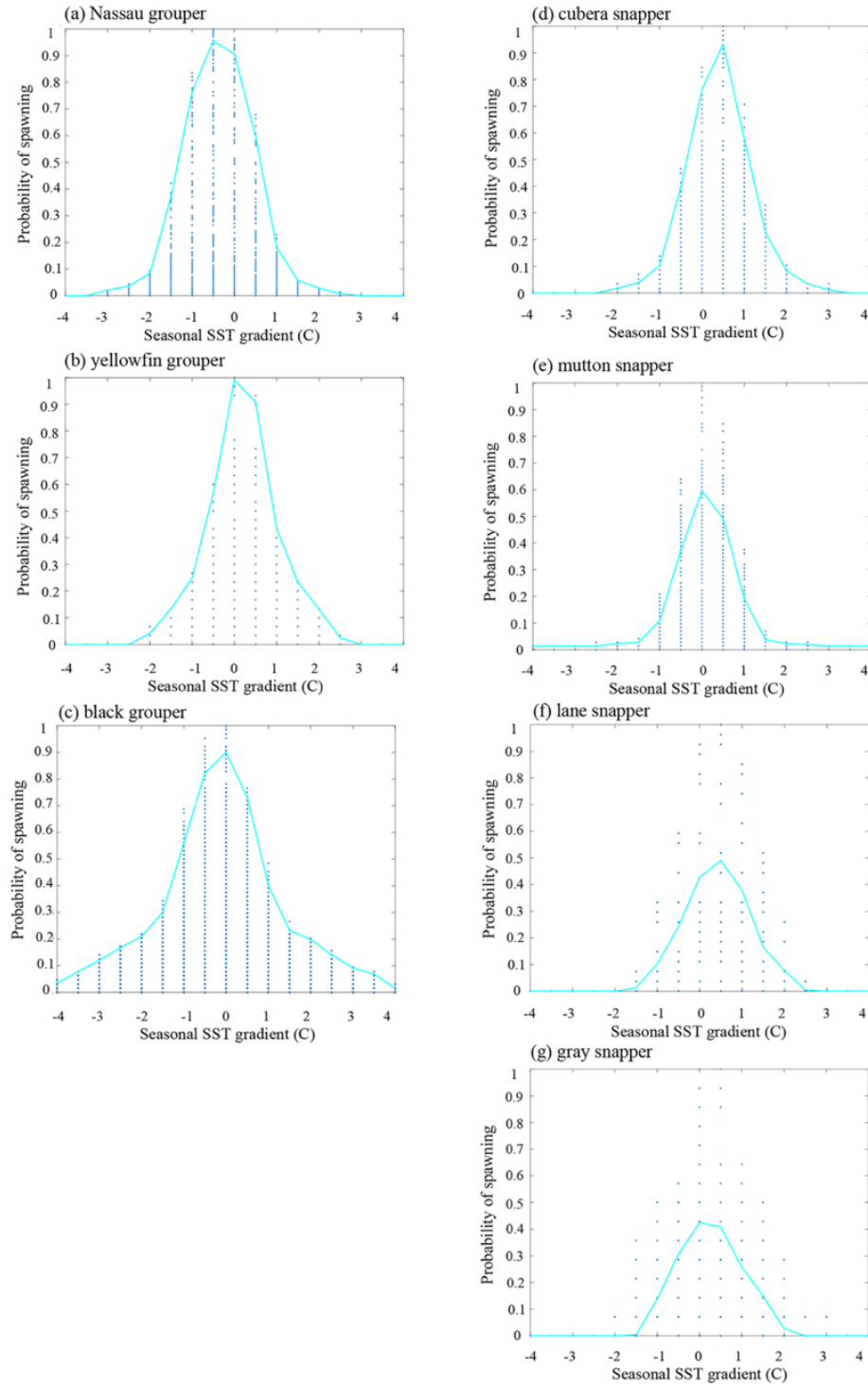


Figure S2. Spawning habitat suitability as a function of seasonal sea surface temperature (SST) gradients based on the Non-Parametric Probability Ecological Niche (NPPEN) model. With the exception of red hind, the species distribution model selected this variable in the model of best fit for all species. Negative seasonal SST gradients indicate spawning occurs as temperatures cool seasonally, while positive values show warming temperatures. Symbols are the same as those described in Figure S1.

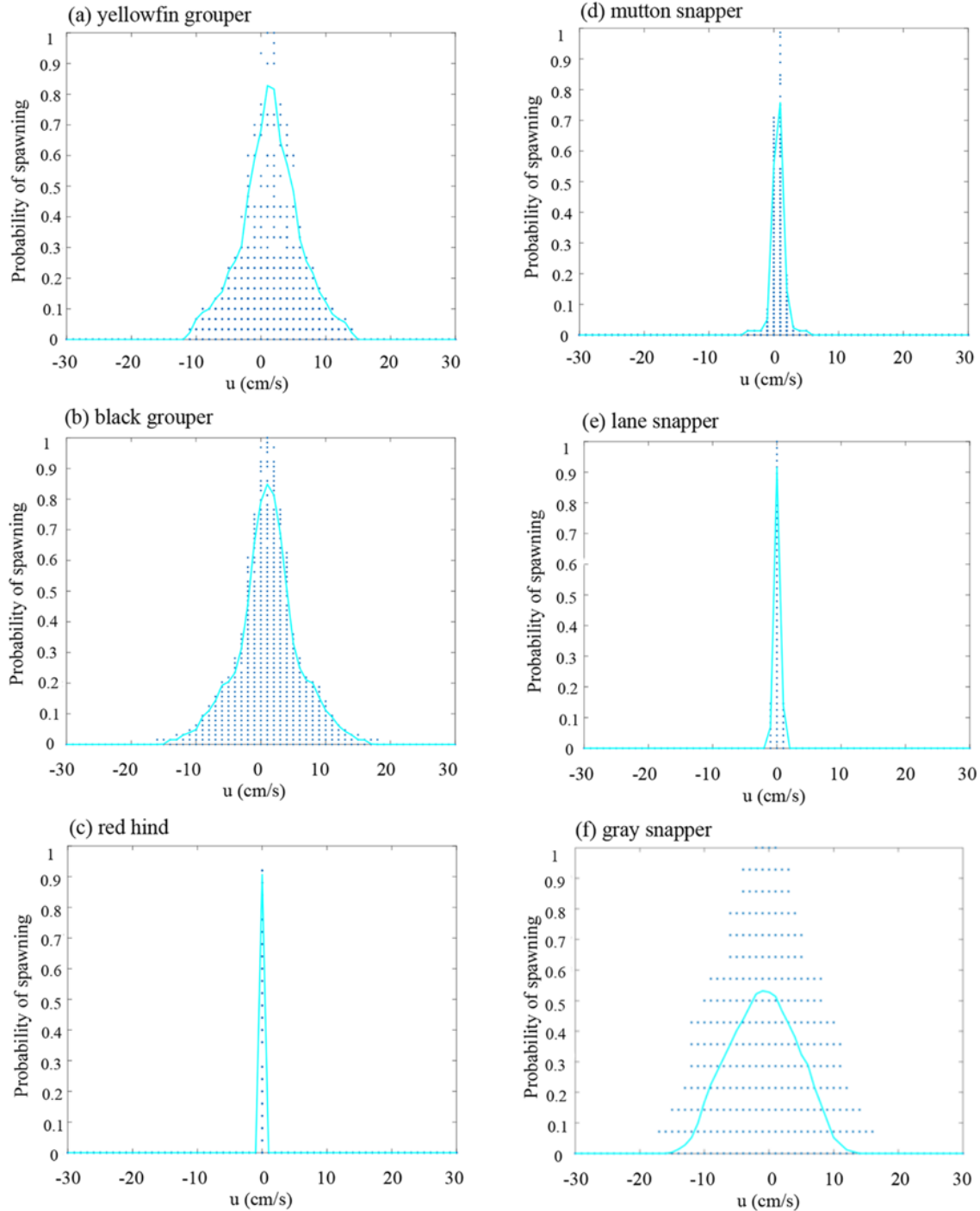


Figure S3. Spawning habitat suitability as a function of seasonal geostrophic currents in the east-west direction ( $u$ ) based on the Non-Parametric Probability Ecological Niche (NPPEN) model. Species with this variable in the model of best fit include yellowfin grouper (a), black grouper (b), red hind (c), mutton snapper (d), lane snapper (e), and gray snapper (f). Symbols are the same as those described in Figure S1.

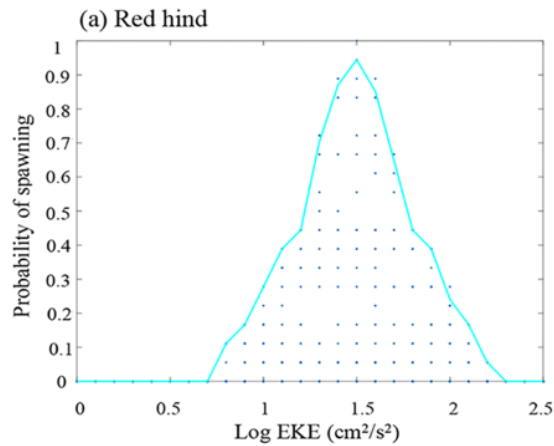


Figure S4. Spawning habitat suitability as a function of eddy kinetic energy (EKE) based on the Non-Parametric Probability Ecological Niche (NPPEN) model. Red hind had EKE selected in the model of best fit as a variable influencing fish spawning aggregation (FSA) distribution. Symbols are the same as those described in Figure S1.

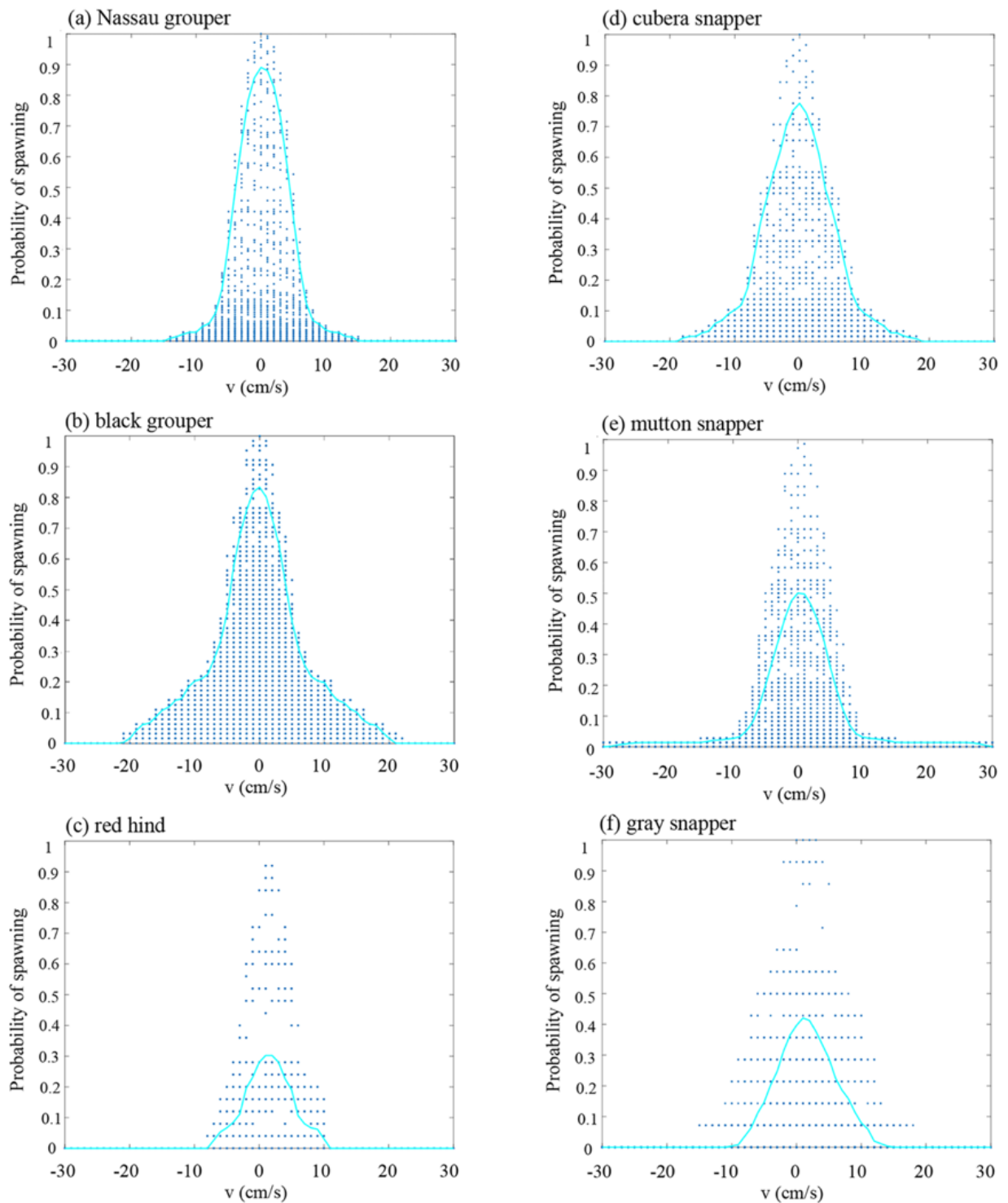


Figure S5. Spawning habitat suitability as a function of seasonal geostrophic currents in the north-south direction ( $v$ ) based on the Non-Parametric Probability Ecological Niche (NPPEN) model. This variable was selected in the model of best fit for all species, except for yellowfin grouper and lane snapper. Symbols are the same as those described in Figure S1.

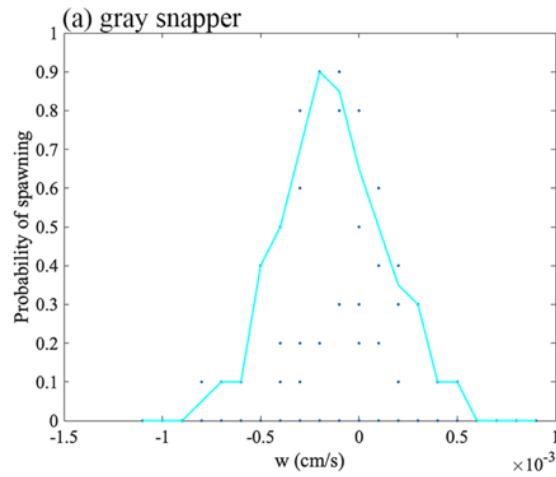


Figure S6. Spawning habitat suitability as a function of vertical velocity ( $w$ ) based on the Non-Parametric Probability Ecological Niche (NPPEN) model. Gray snapper was the only species with vertical velocity selected as a variable influencing fish spawning aggregation (FSA) distribution. Symbols are the same as those described in Figure S1.

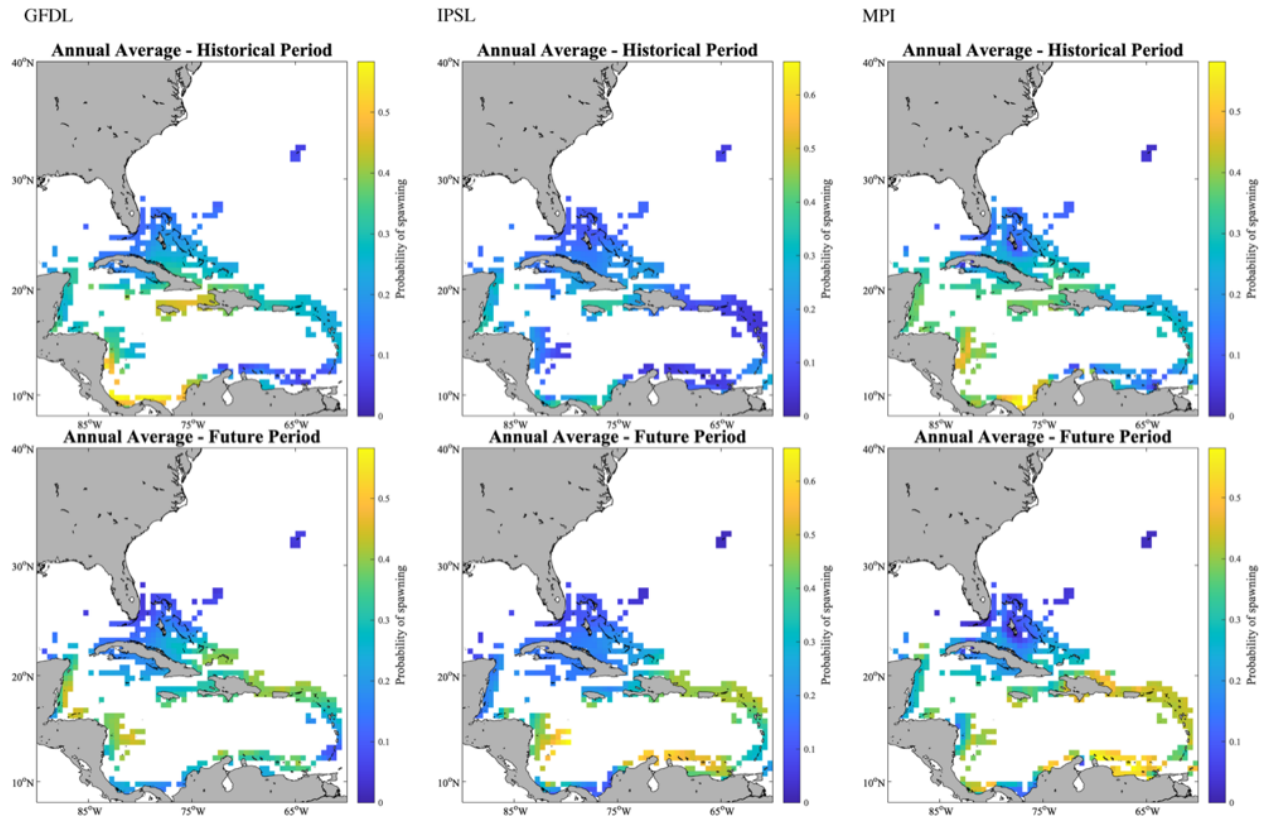


Figure S7. Average annual suitable ocean spawning habitat for cubera snapper during historical (a-c, 1981-2000) and end of century (d-f, 2081-2100) periods, for three models: GFDL (left), IPSL (middle) and MPI (right).