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SUPPLEMENTARY INFORMATION
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Global change in marine aquaculture production potential under climate change

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Supplementary Information

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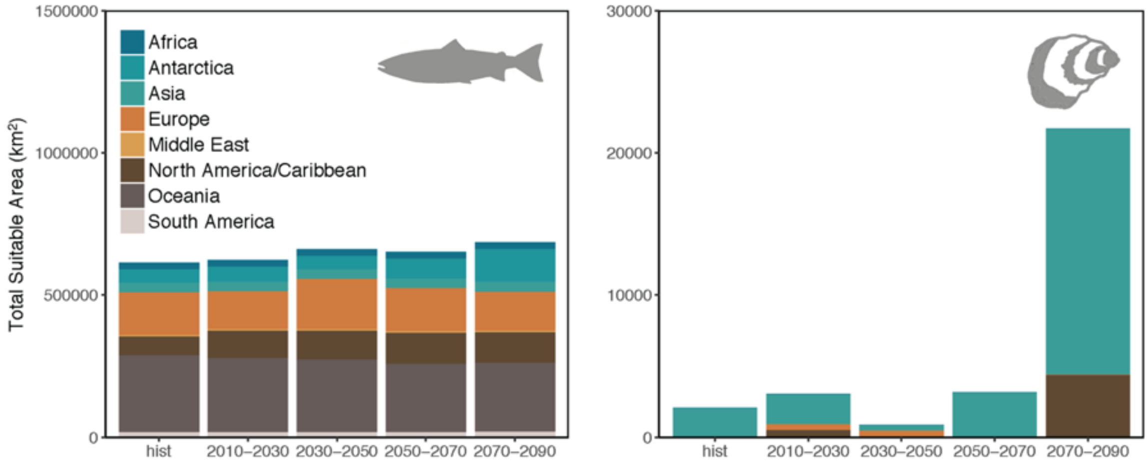
Supplementary Table 1. Models incorporated in the ensemble (if applicable) approach for each output layer: sea surface temperature (*SST*), total chlorophyll (*chl*), and ocean acidification (*OA* assessed using aragonite saturation).

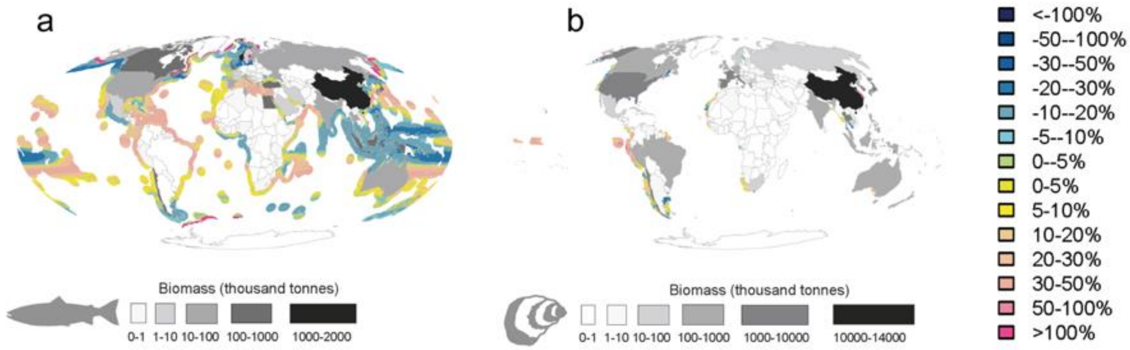
SST models	Chl models	OA models
ACCESS1-0	CAN-ESM2	CCSM3
ACCESS1-3	CESM1-BGC	
CAN-ESM2	CMCC-CESM	
CCSM4	CNRM-CM5	
CESM1-BGC	GFDL-ESM2M	
CESM1-CAM5	GFDL-EMS2G	
CMCC-CESM	HADGEM-CC	
CMCC-CM	HADGEM-ES	
CNRM-CM5	IPSL-CM5A-LR	
CSIRO-MK3-6-0	IPSL-CM5A-MR	
GFDL-CM3	IPSL-CM5B-LR	
GFDL-ESM2M	MPI-ESM-LR	
GFDL-EMS2G	MPI-ESM-MR	
GISS-E2-H		
GISS-E2-R		
HADGEM-CC		
HADGEM-ES		
INMCM4		
IPSL-CM5A-LR		
IPSL-CM5A-MR		
IPSL-CM5B-LR		
MIROC-ESM		
MIROC5		
MPI-ESM-LR		
MPI-ESM-MR		
NORESM1-ME		
NORESM1-M		

Supplementary Table 2. Modelling assumptions from *Gentry et al. (2017)*

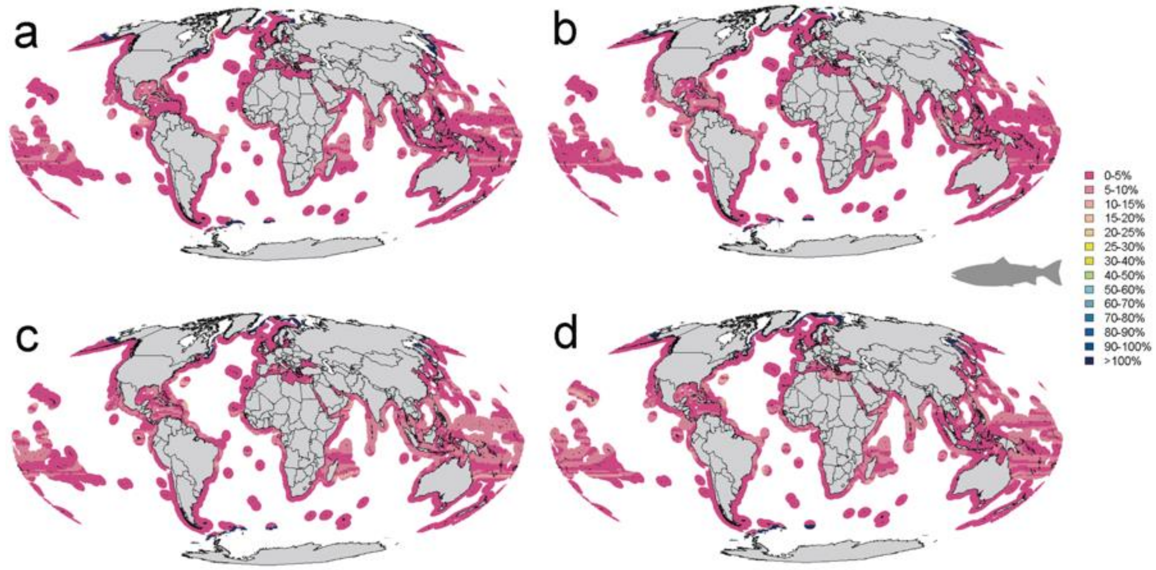
Model Description	Equation	Parameters
Growth Performance Index (Φ')	$\Phi' = \log_{10}K + 2\log_{10}L_{\infty}$	K = growth coefficient (cm yr^{-1}); L_{∞} = asymptotic length (cm)
Finfish time (T_F) to harvest (35 cm, 548g)	$\ln(T_F) = 7.68\text{-}5.82\ln(\Phi'_F)$	Φ'_F = finfish GPI
Bivalve time (T_F) to harvest (4 cm)	$\ln(T_B) = 2.99\text{-}1.66\Phi'_B$	Φ'_B = bivalve GPI
Finfish production (B_F)	$B_F = (sVn)/T_F$	s = stocking density (11 kg m^{-3}); V = cage volume (9,000 m^3); n = number of cages (24); T_F = finfish time to harvest
Bivalve production (B_B)	$B_B = (fLn)/T_B$	f = fuzzy line seed density (330 bivalves m^{-1}); L = length of rope (4,000 m); n = number of lines (100); T_B = bivalve time to harvest



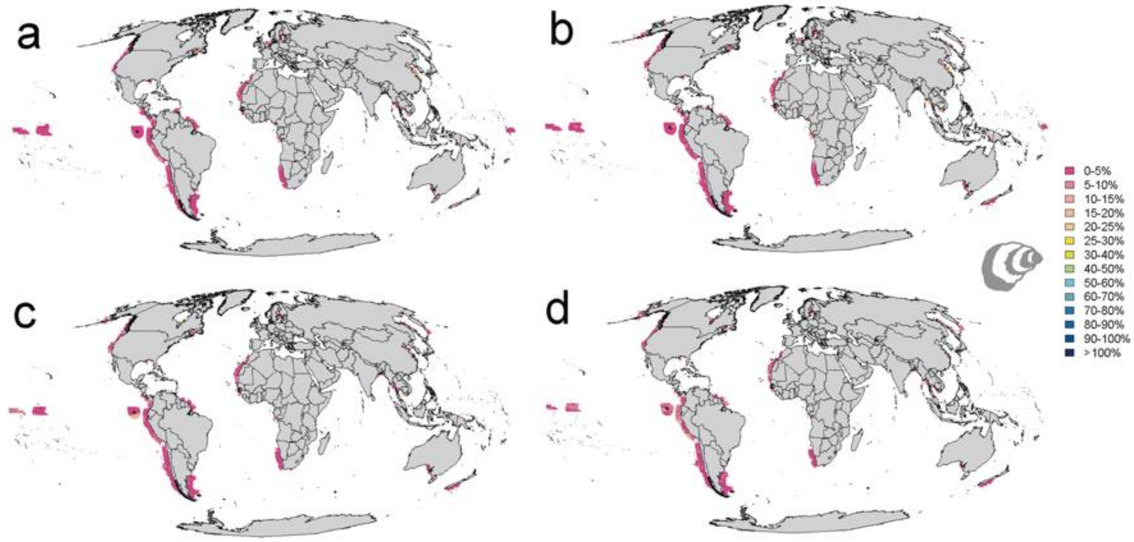
Supplementary Figure 1. Standard deviations of suitable area (km^2) for finfish (*left panel*) and bivalves (*right panel*) for each time-step and region (includes Φ' values equal to zero). For finfish, each time-step had an average of 33 countries with 1-15% (median= 2%) deviation from the mean. For bivalves, each interval had an average of four countries with <1% (median = 0.2%) variability in suitable area, expect China in the latter two time-steps (2050-2070 and 2070-2090), with 1.2% and 10% deviation from the mean, respectively, and Canada with 1.3% (2070-2090).



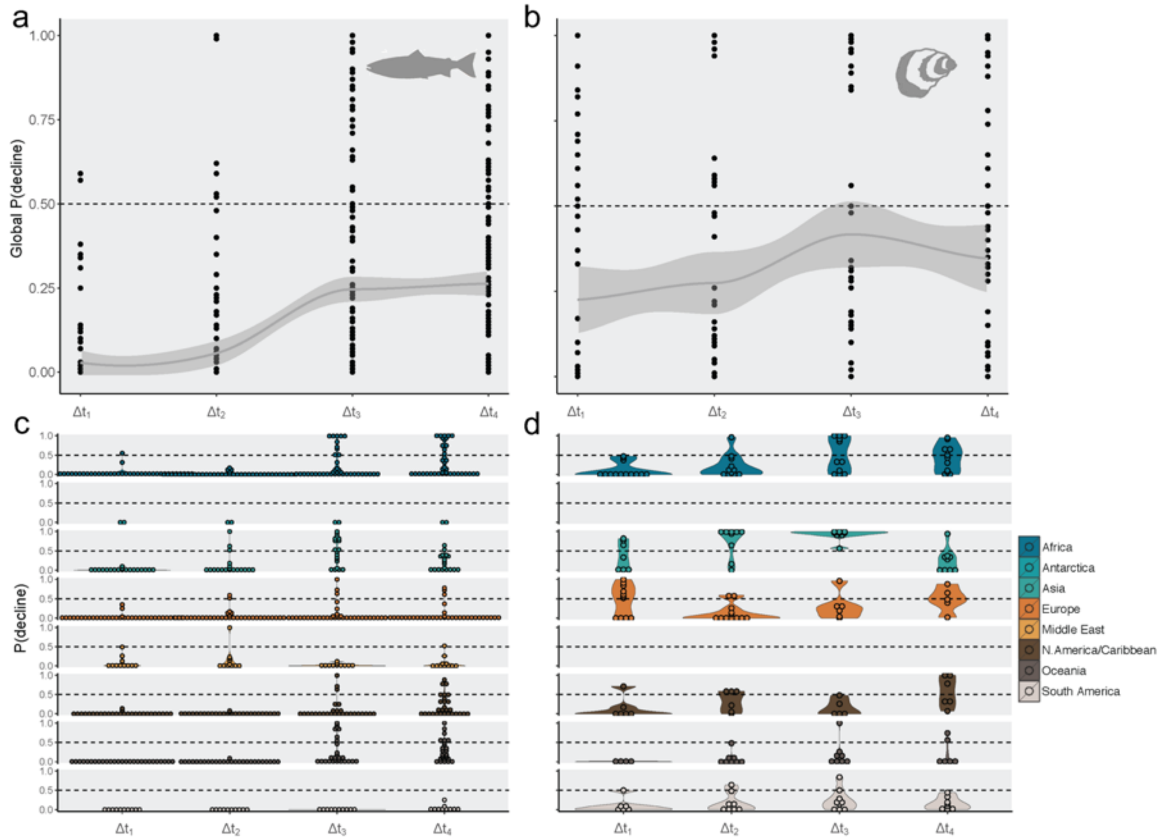
Supplementary Figure 2. Cumulative change in percent aquaculture production potential across EEZs for (a) finfish and (b) bivalve aquaculture across the four average changes in time ($\Delta t_{1+2+3+4}$). Countries currently (2015) producing (in thousand tonnes) marine and brackish finfish and molluscs are highlighted by *gray-scale* coloration. Areas initially unsuitable or where changes result in *NAs* cause some waters not to be fully captured in the cumulative plot, but are shown in the time-step percentages in the main Figures 2 and 3.



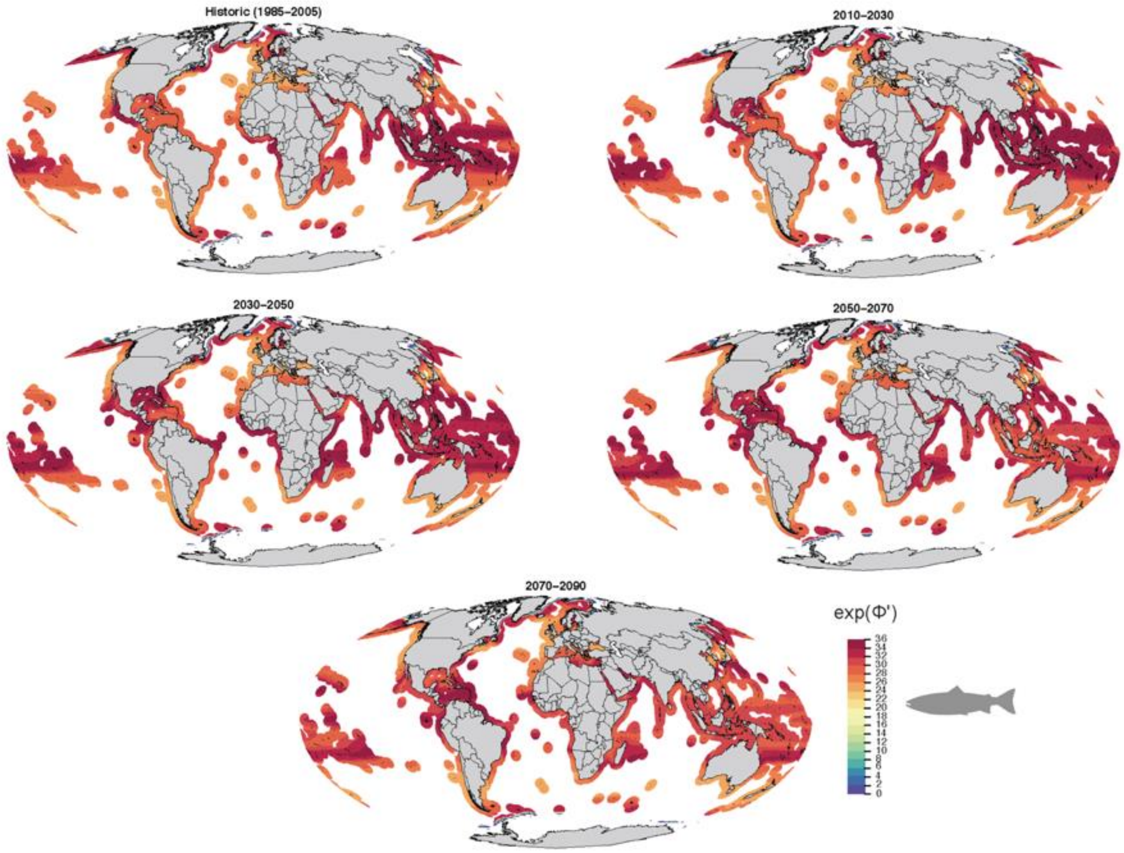
Supplementary Figure 3. Standard deviation of change in proportion of finfish production potential for (a) 2010-2030 relative to historic (1985-2005; Δt_1), (b) 2030-2050 relative to 2010-2030 (Δt_2), (c) 2050-2070 relative to 2030-2050 (Δt_3), and (d) 2070-2090 relative to 2050-2070 (Δt_4).



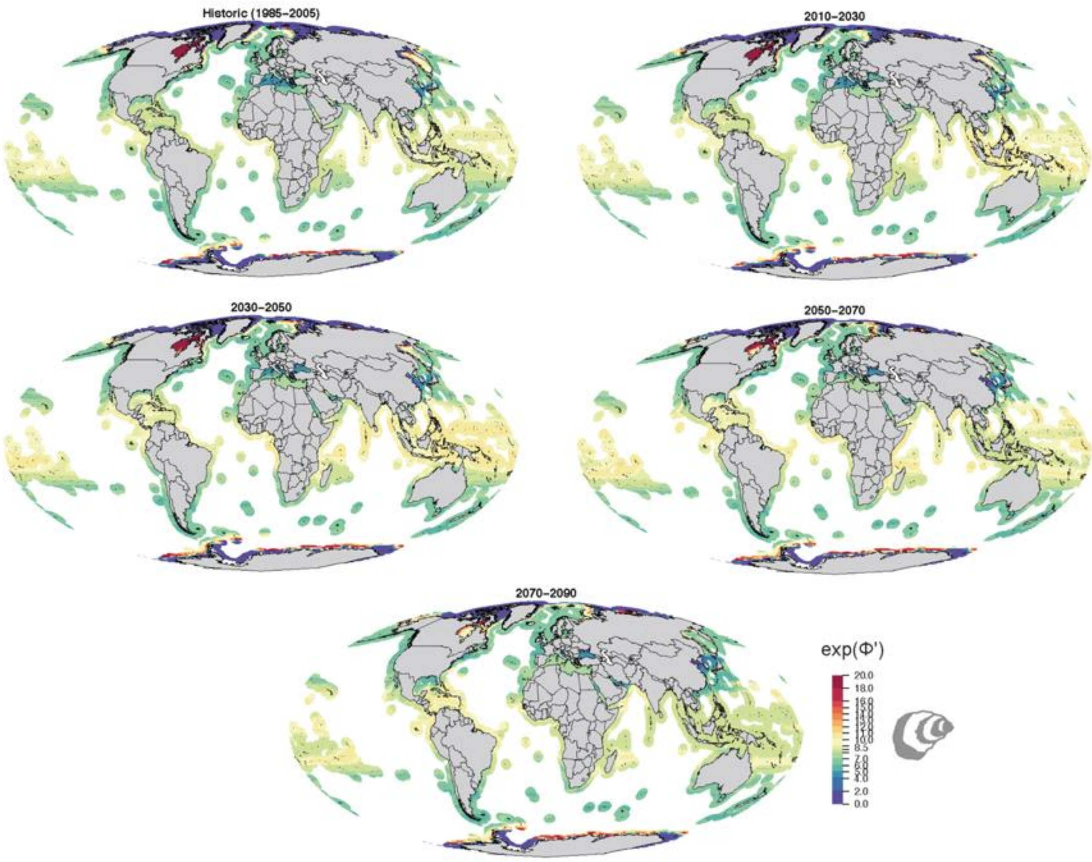
Supplementary Figure 4. Standard deviation of changes in proportion of bivalve production potential for (a) 2010-2030 relative to historic (1985-2005; Δt_1), (b) 2030-2050 relative to 2010-2030 (Δt_2), (c) 2050-2070 relative to 2030-2050 (Δt_3), and (d) 2070-2090 relative to 2050-2070 (Δt_4).



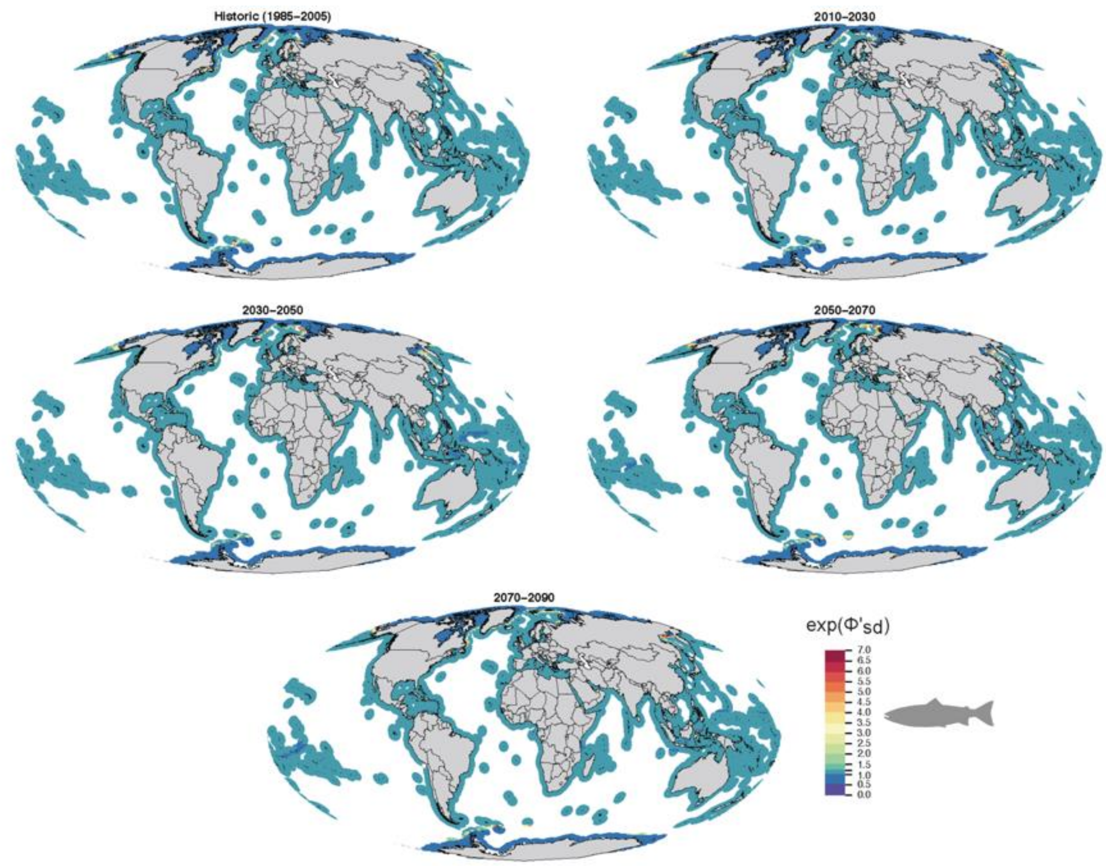
Supplementary Figure 5. Probability of aquaculture production potential declines greater than 10% over time, for a given country (Exclusive Economic Zone) (a-b) globally and (c-d) regionally for finfish (*left panels*) and bivalves (*right panels*). The global and regional representations over each time-step spans from 0 to 1, with 0.5 indicated with *dashed lines*. A loess-smoother (± 95% CI) was fit for average reference of the non-linear trajectory (a, b) for the global plots. Each dot in all plots represents a country or territory.



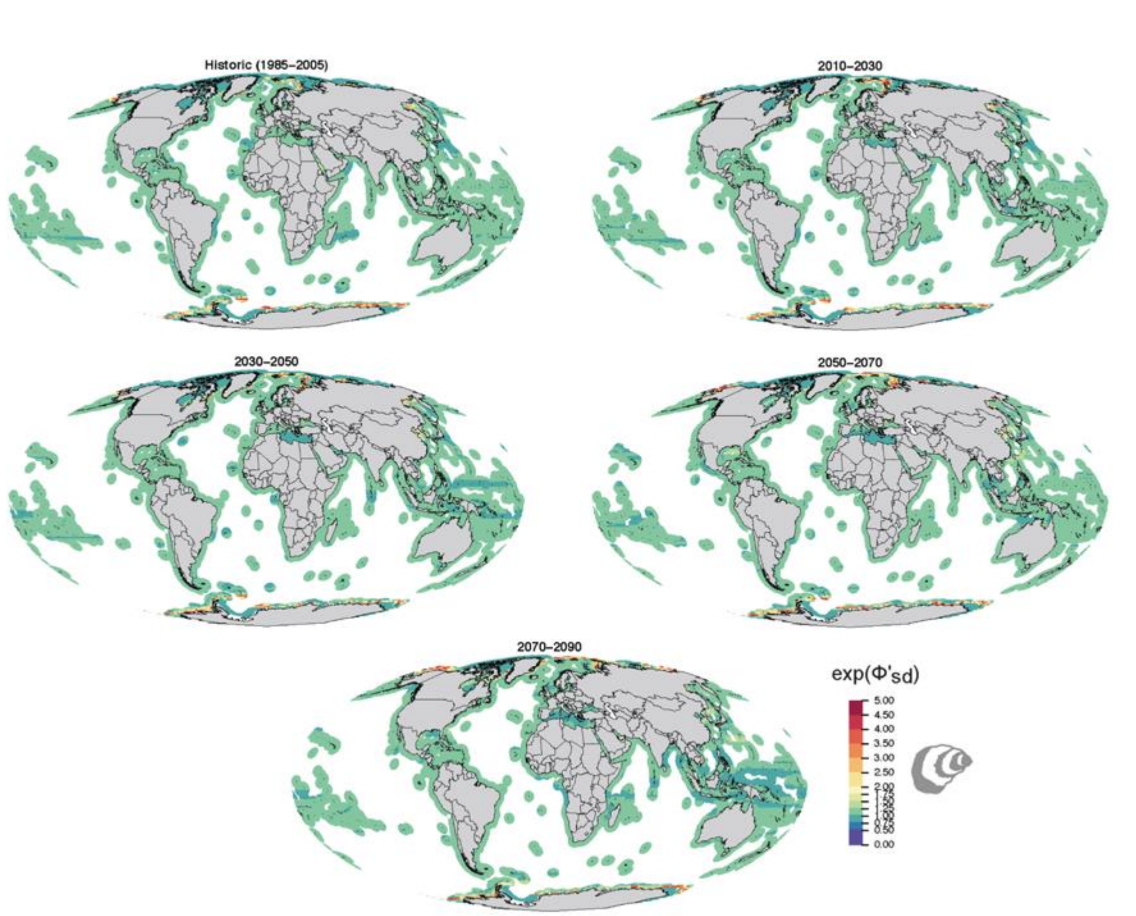
Supplementary Figure 6. Exponentiated mean finfish Growth Performance Index (Φ') for each time interval.



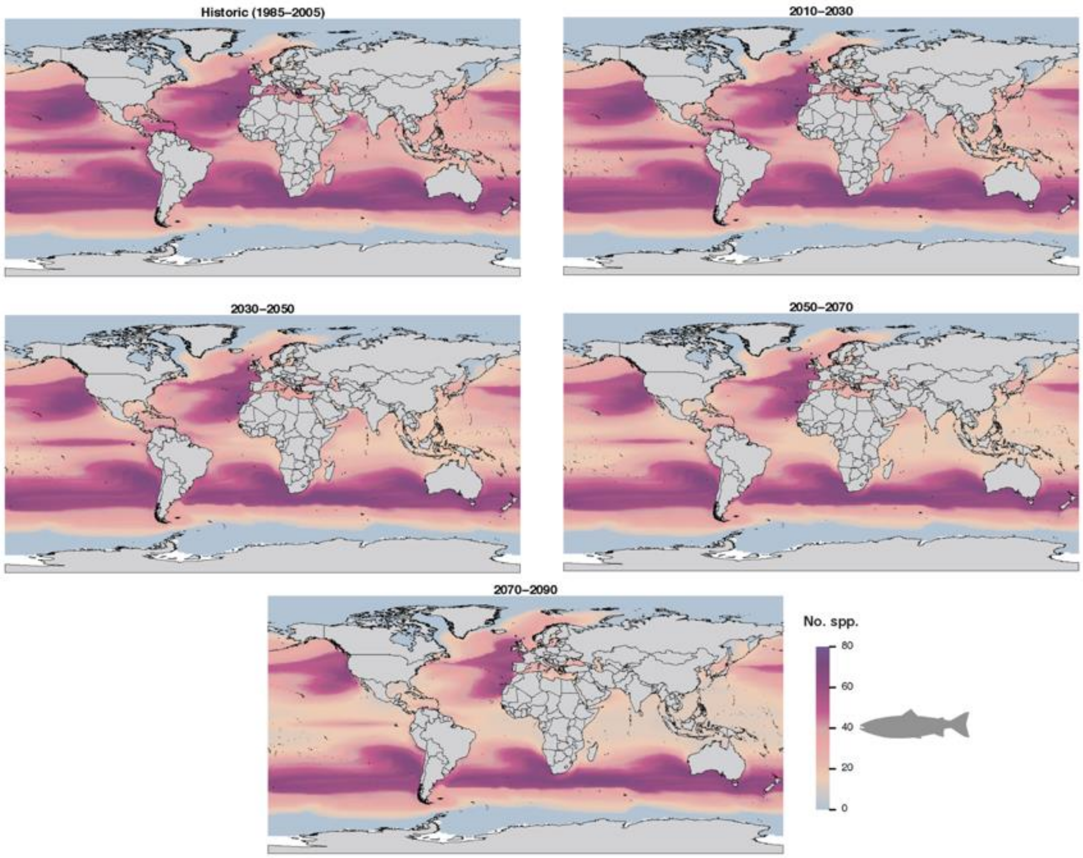
Supplementary Figure 7. Exponentiated mean bivalve Growth Performance Index (Φ') for each time interval. Bounds of only temperature and EEZs are depicted for ease of visualization.



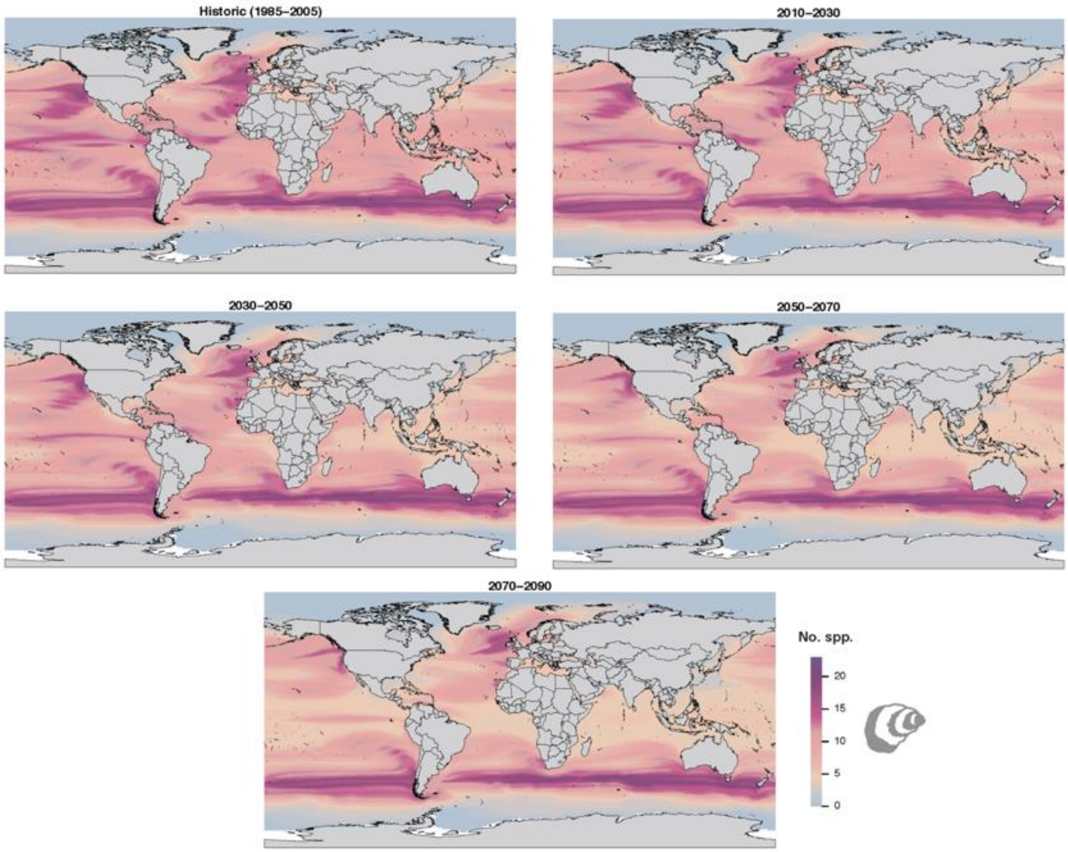
Supplementary Figure 8. Exponentiated finfish Growth Performance Index (Φ') standard deviation (sd).



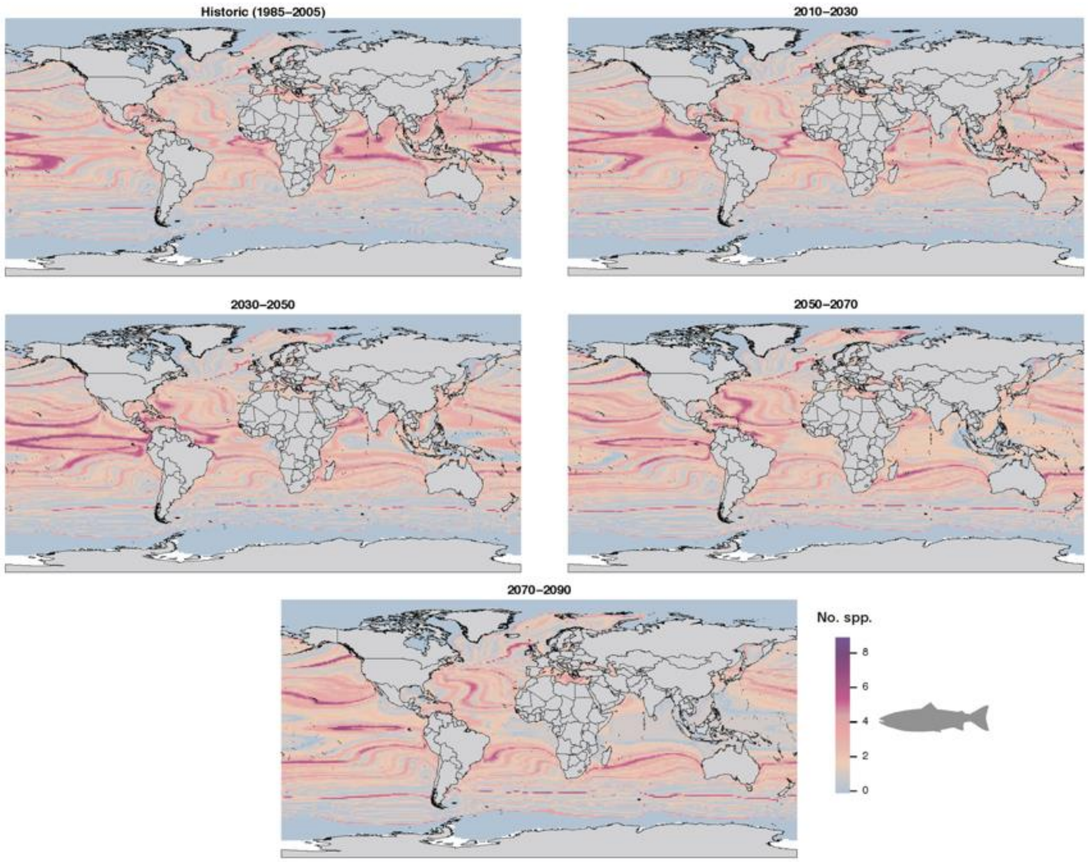
Supplementary Figure 9. Exponentiated bivalve Growth Performance Index (Φ') standard deviation (sd). Bounds of only temperature and EEZs are depicted for ease of visualization.



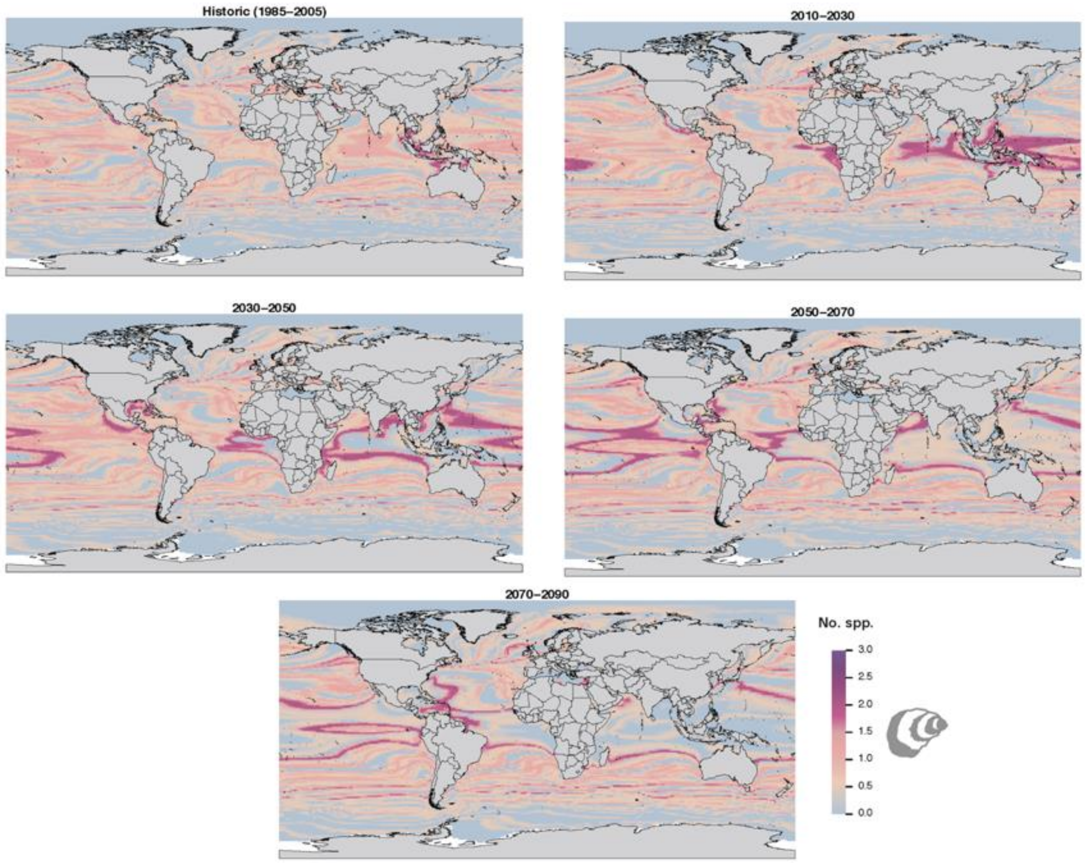
Supplementary Figure 10. Mean number of finfish species which contribute to the composite Growth Performance Index (Φ').



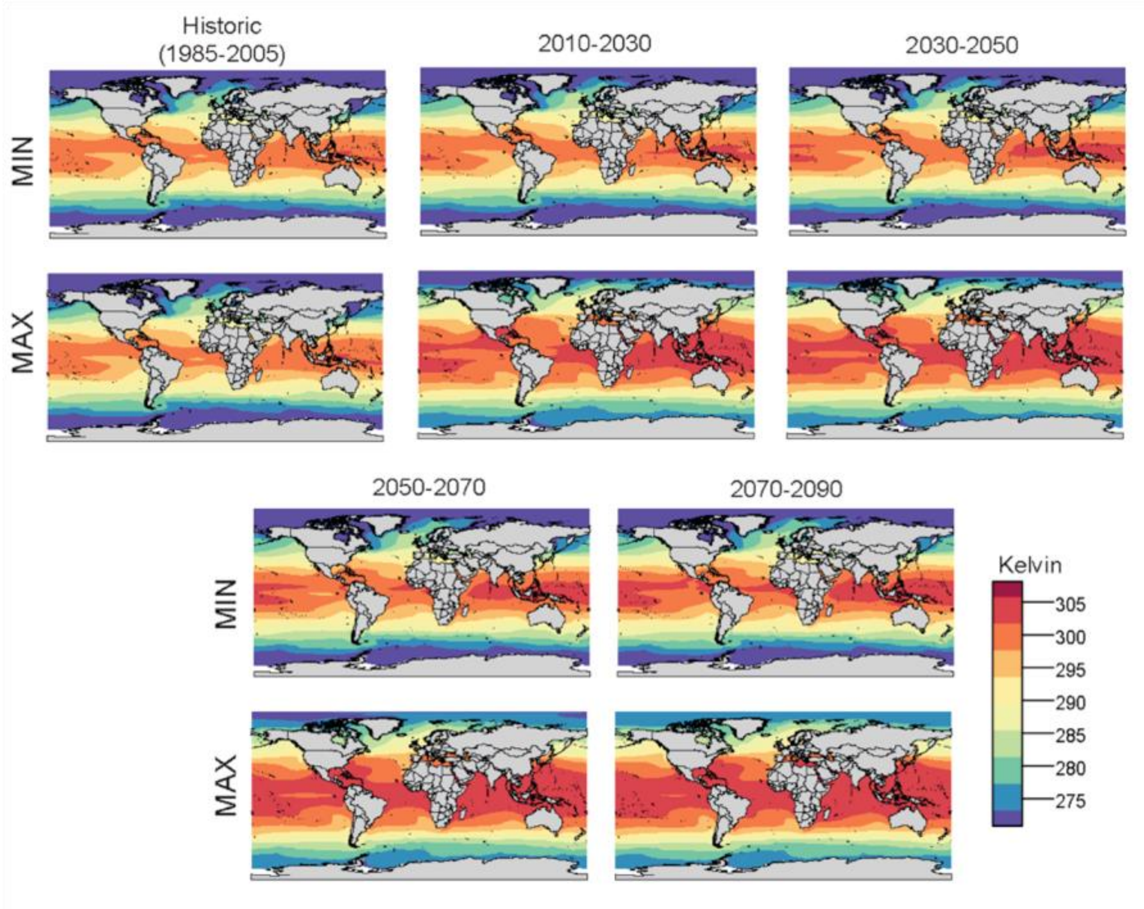
Supplementary Figure 11. Mean number of bivalve species which contribute to the composite Growth Performance Index (Φ’).



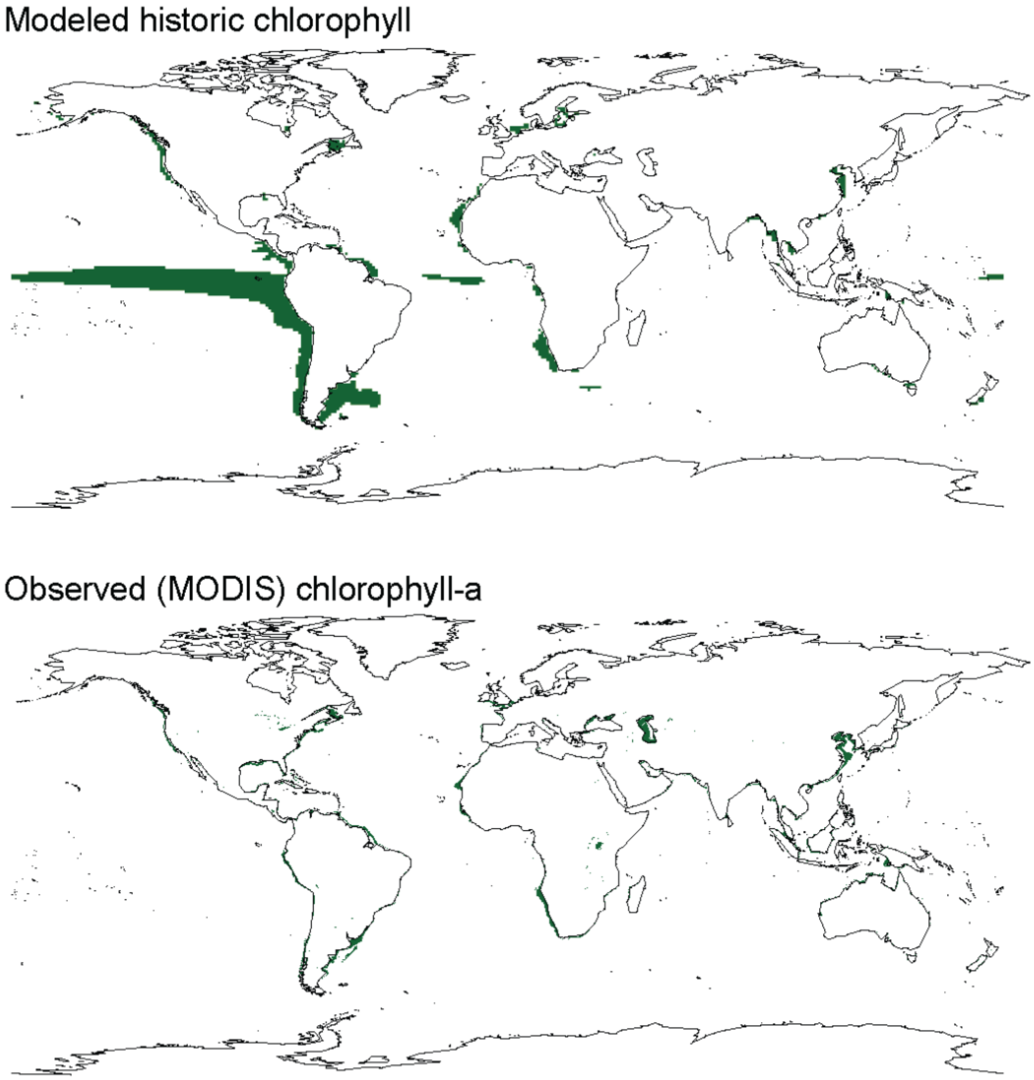
Supplementary Figure 12. Standard deviation of the number of finfish species which contribute to the composite Growth Performance Index (Φ').



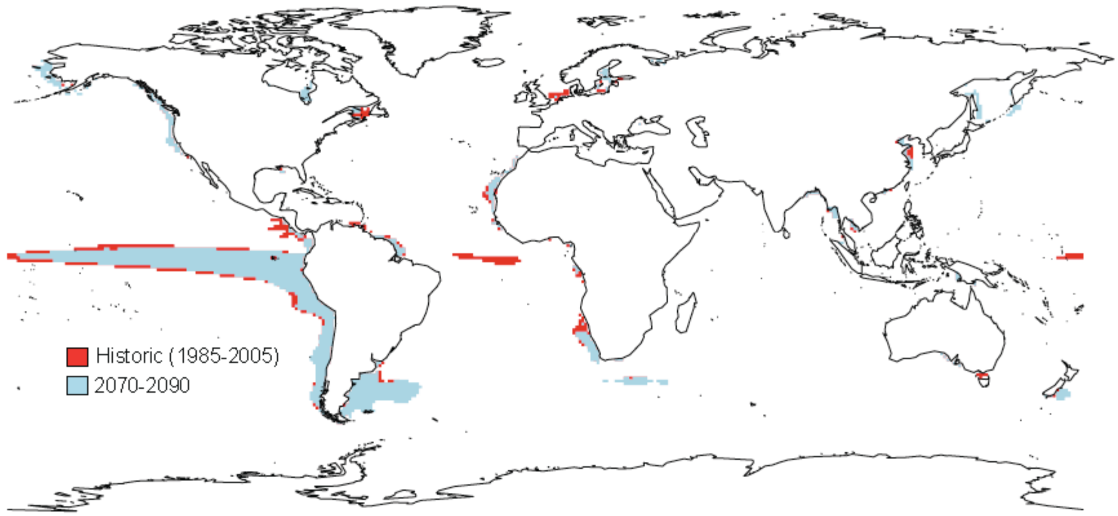
Supplementary Figure 13. Standard deviation of the number of bivalve species which contribute to the composite Growth Performance Index (Φ').



Supplementary Figure 14. Ensemble model sea surface temperature (SST) output (Kelvin) of average maximum and minimum values for each time interval (1x1 degree).



Supplementary Figure 15. Spatial distribution for (*upper panel*) historic ensemble model average total chlorophyll predictions (1x1 degree; kg m^{-3}) and (*lower panel*) to observed MODIS chlorophyll-a reported in Gentry et al.[4]. Chlorophyll (proxy for phytoplankton, the required food source for bivalve aquaculture) is depicted in dark green in both panels.



Supplementary Figure 16. Historic ensemble average outputs (*red*) versus the 2070-2090 time-step (*light blue*) demonstrating the spatiotemporal patterns of change in proxy for phytoplankton (required food source for bivalve aquaculture).