SUPPLEMENTARY TABLES

	Annual mean	Units
det_btm	14.46	g m^{-2} d^{-1}
lgz	421.91	g m^{-2}
loss_lgz	9.52	g m^{-2} d^{-1}
loss_mdz	12.46	g m^{-2} d^{-1}
mdz	501.13	g m^{-2}
NPP	350.46	mg C m^{-2} d^{-1}
T_b	2.48	ºC
T_p	12.61	ºC

Table S1. Annual mean values of the ESM2.6-COBALT climatology outputs used as FEISTY forcing (Table 1).

	$\log_{10}$(Zl:Det)	**PelT**	**Frac<200**	**$\log_{10}$(NPP)**
Intercept	**-0.54**	**-0.52**	**-0.52**	**-0.53**
	(-0.07)	(-0.08)	(-0.08)	(-0.07)
$\log_{10}$(Zl:Det)	**1.00**			
	(-1.00)			
PelT		**1.96**		
		(-2.00)		
Frac<200			**1.00**	
			(-1.00)	
$\log_{10}$(NPP)				**1.87**
				(-1.98)
AIC	-105.50	-79.07	-64.77	-85.46
BIC	-98.93	-70.32	-58.20	-76.73
Log Likelihood	55.75	43.53	35.39	46.71
Deviance	56.73	54.50	56.58	54.89
Deviance explained	0.68	0.49	0.30	0.55
Dispersion	1.00	1.00	1.00	1.00
R^2	0.51	0.31	0.24	0.37
GCV score	-52.17	-38.07	-32.12	-41.79
Num. obs.	66	66	66	66
Num. smooth terms	1	1	1	1

Table S2. Estimated parameters and summary statistics of generalized additive models of the LME-scale fraction of large pelagic fish vs. demersal fish (P/(P+D)) as a function of the individual terms: the $\log_{10}$ transformed ratio of zooplankton losses to higher predators to seafloor detritus flux ($\log_{10}$ Zl:Det), mean pelagic temperature in the top 100 m (PelT), the fraction of LME area <200 m (Frac200), and the $\log_{10}$ transformed net primary production (NPP). Bold numbers denote significance with $p \leq 0.05$.

	log_{10}(Zl:Det)	**PelT**	**Frac<200**	**log_{10}(NPP)**
Intercept	**-0.22** (-0.08)	**-0.22** (-0.08)	**-0.23** (-0.09)	**-0.22** (-0.08)
log_{10}(Zl:Det)	**1.00** (-1.00)			
PelT		**1.96** (-2.00)		
Frac<200			**1.00** (-1.00)	
log_{10}(NPP)				**1.00** (-1.00)
AIC	-18.53	-24.00	-8.21	-15.88
BIC	-11.96	-15.25	-1.64	-9.31
Log Likelihood	12.26	16.00	7.10	10.94
Deviance	52.07	51.72	51.28	51.60
Deviance explained	0.26	0.35	0.09	0.22
Dispersion	1.00	1.00	1.00	1.00
R^2	0.19	0.35	0.05	0.18
GCV score	-9.07	-10.60	-3.99	-7.74
Num. obs.	66	66	66	66
Num. smooth terms	1	1	1	1

Table S3. Estimated parameters and summary statistics of generalized additive models of the LME-scale fraction of large pelagic fish vs. forage fish (P/(P+F)) as a function of the individual terms: the log_{10} transformed ratio of zooplankton losses to higher predators to seafloor detritus flux (log_{10} Zl:Det), mean pelagic temperature in the top 100 m (PelT), the fraction of LME area <200 m (Frac200), and the log_{10} transformed net primary production (NPP). Bold numbers denote significance with $p \leq 0.05$.

	log_{10}(Zl:Det)	**PelT**	**Frac<200**	**log_{10}(NPP)**
Intercept	**0.11** (-0.05)	**0.11** (-0.04)	**0.11** (-0.05)	**0.11** (-0.05)
log_{10}(Zl:Det)	**1.00** (-1.00)			
PelT		**1.90** (-1.99)		
Frac<200			**1.00** (-1.00)	
log_{10}(NPP)				1.49 (-1.74)
AIC	-59.62	-96.25	-51.45	-44.11
BIC	-53.05	-87.52	-44.88	-35.93
Log Likelihood	32.81	52.12	28.72	25.80
Deviance	60.85	61.36	60.48	59.61
Deviance explained	0.24	0.59	0.13	0.05
Dispersion	1.00	1.00	1.00	1.00
R^2	0.20	0.60	0.11	0.02
GCV score	-28.56	-45.78	-24.59	-21.15
Num. obs.	66	66	66	66
Num. smooth terms	1	1	1	1

Table S4. Estimated parameters and summary statistics of generalized additive models of the LME-scale fraction of large fishes to medium fishes (L/(L+M)) as a function of the individual terms: the log_{10} transformed ratio of zooplankton losses to higher predators to seafloor detritus flux (log_{10} Zl:Det), mean pelagic temperature in the top 100 m (PelT), the fraction of LME area <200 m (Frac200), and the log_{10} transformed net primary production (NPP). Bold numbers denote significance with $p \leq 0.05$.

SUPPLEMENTARY FIGURES

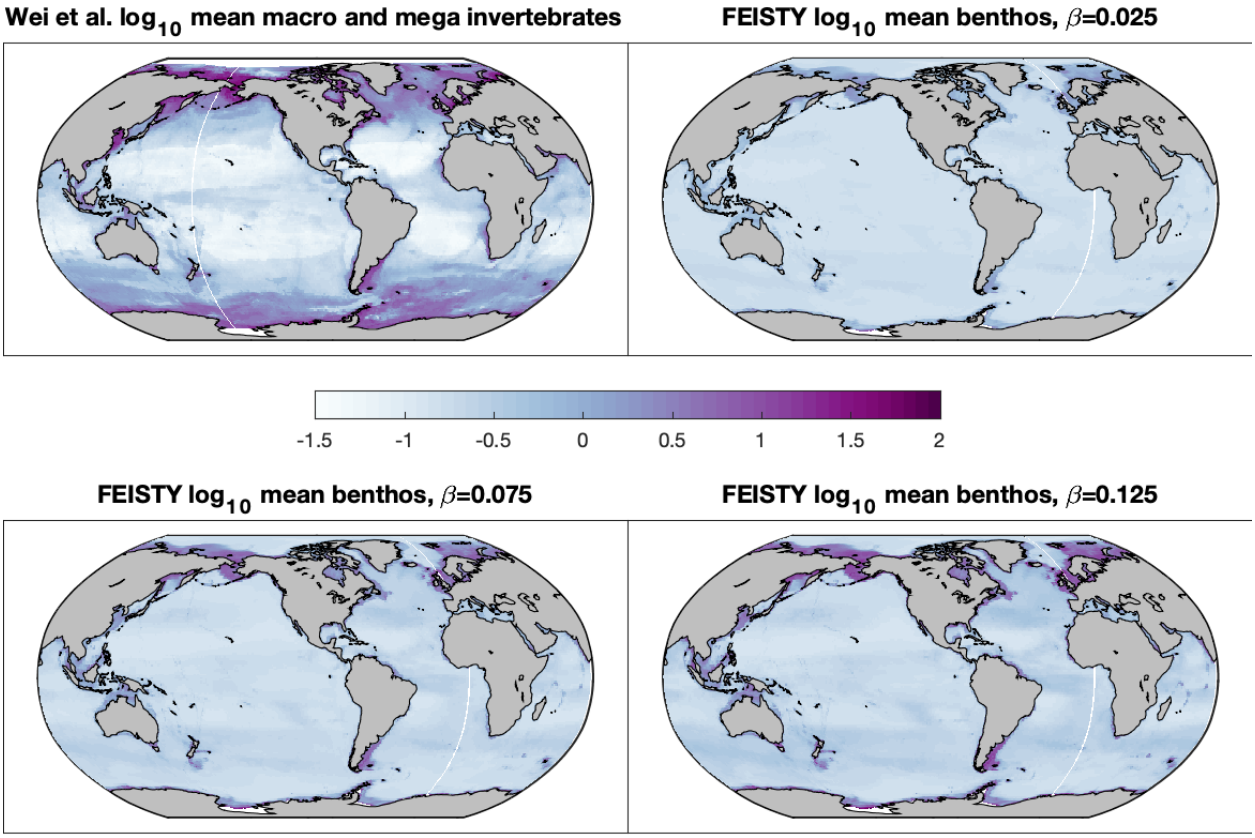

Figure S1. Mean $\log_{10}$ biomass (g m^{-2}) of macrofauna and mega invertebrates statistically estimated by Wei et al. (2010) and benthic invertebrates simulated by FEISTY with varying benthic efficiencies (??).

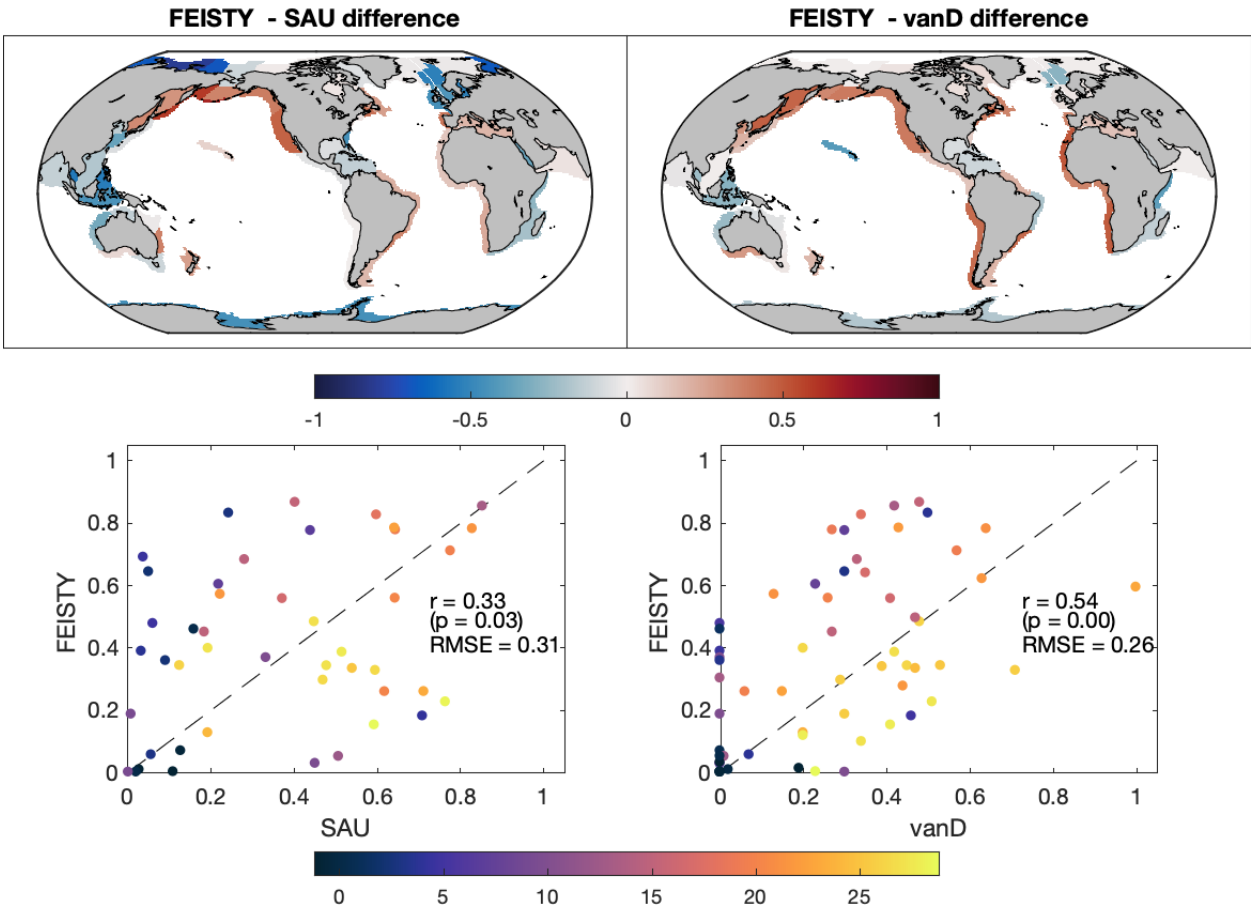

Figure S2. (Top) Differences between modeled catch fraction of pelagics vs. demersals and (Bottom) Correlations between modeled catch fraction of pelagics vs. demersals. Comparisons with (Left) SAU catch reconstructions and (Right) vanD (van Denderen et al. 2018) modeled fractions. Dot colors indicate mean pelagic (top 100 m) temperature (ºC) of the LME.

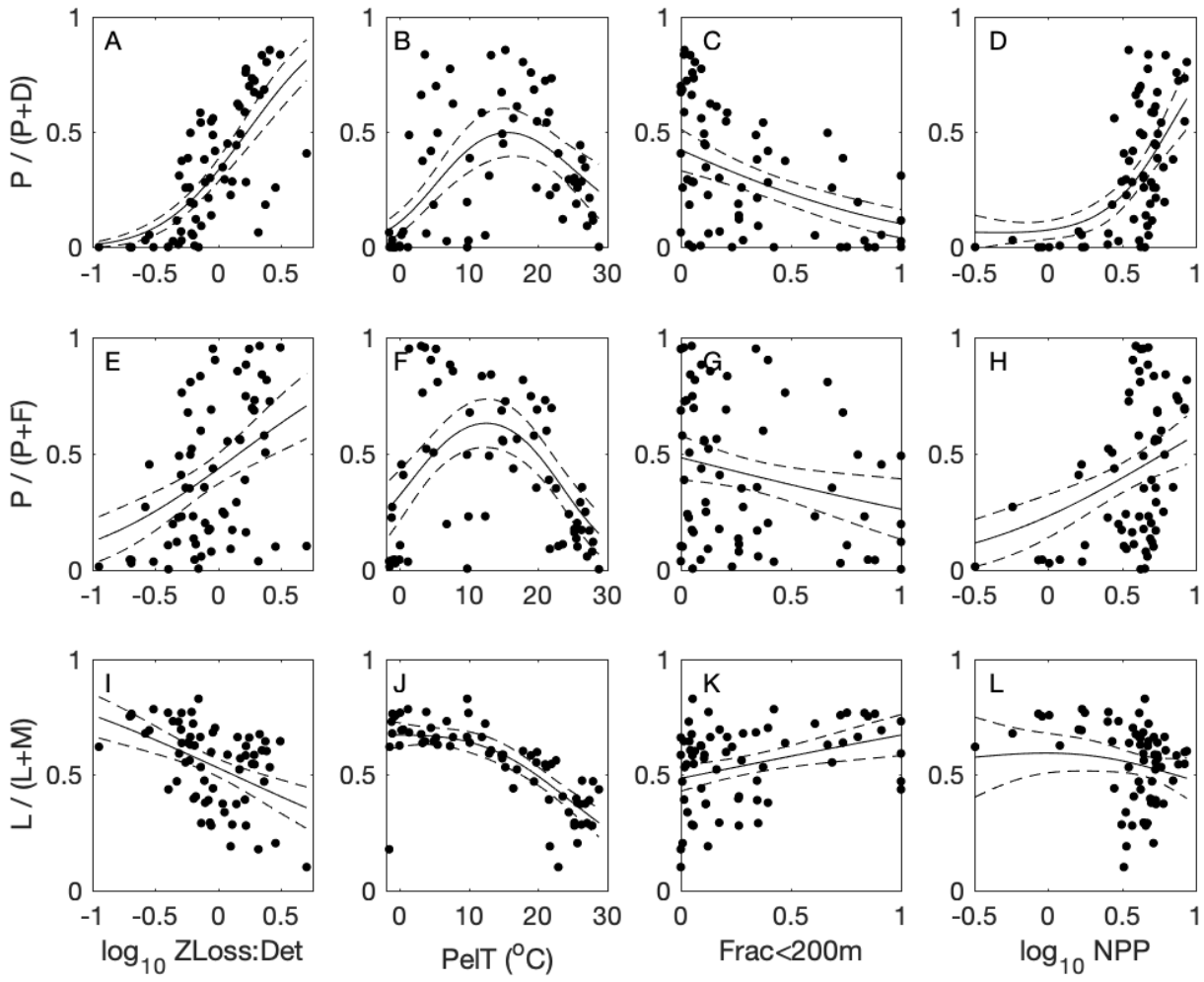

Figure S3. Generalized additive model fits of the fraction of large pelagics compared to (top) demersals and (middle) forage fishes, and (bottom) the fraction of large fishes compared to medium fishes as functions of the ratio of zooplankton production to bottom detritus flux (log_{10} ZLoss:Det), the mean pelagic (0-100 m) temperature (Tpel), the fraction of the LME area that was <200 m (Frac<200m), and net primary production (log_{10} NPP (mg C m^{-2} d^{-1})) individually.

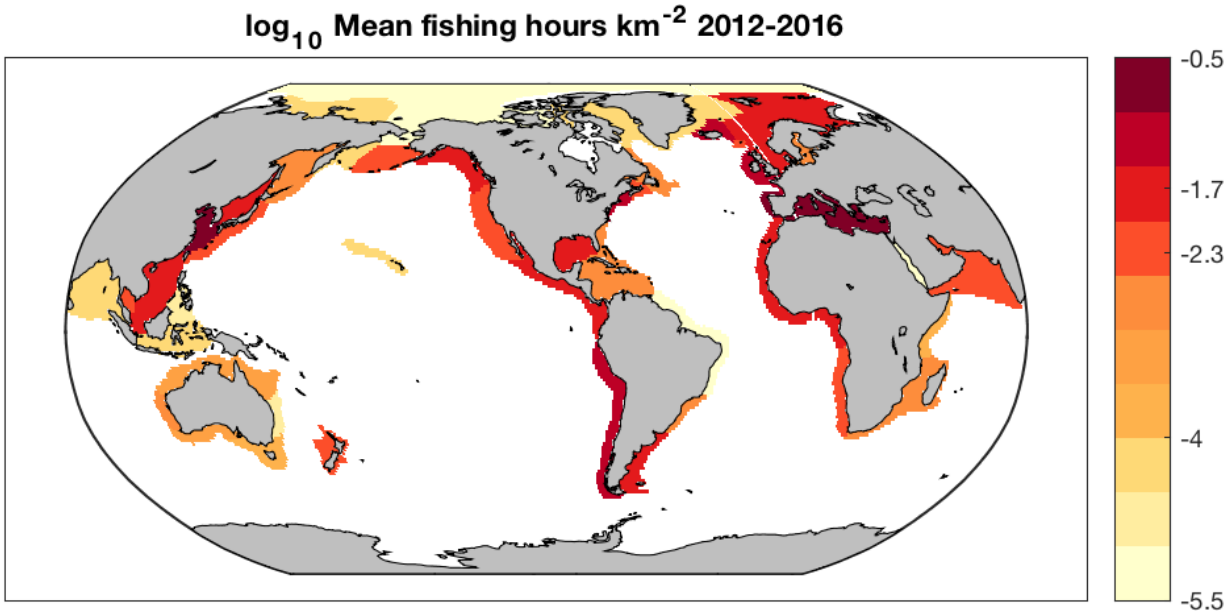

Figure S4. Mean purse seine fishing effort (log_{10} hrs km^{-2}) from 2012-2016 on the LME scale. Data from Global Fishing Watch (Kroodsma et al. 2018). The effort values on the colorbar indicate the 0.01, 0.25, 0.50, 0.75, and 0.99 quantiles of all nonzero values.

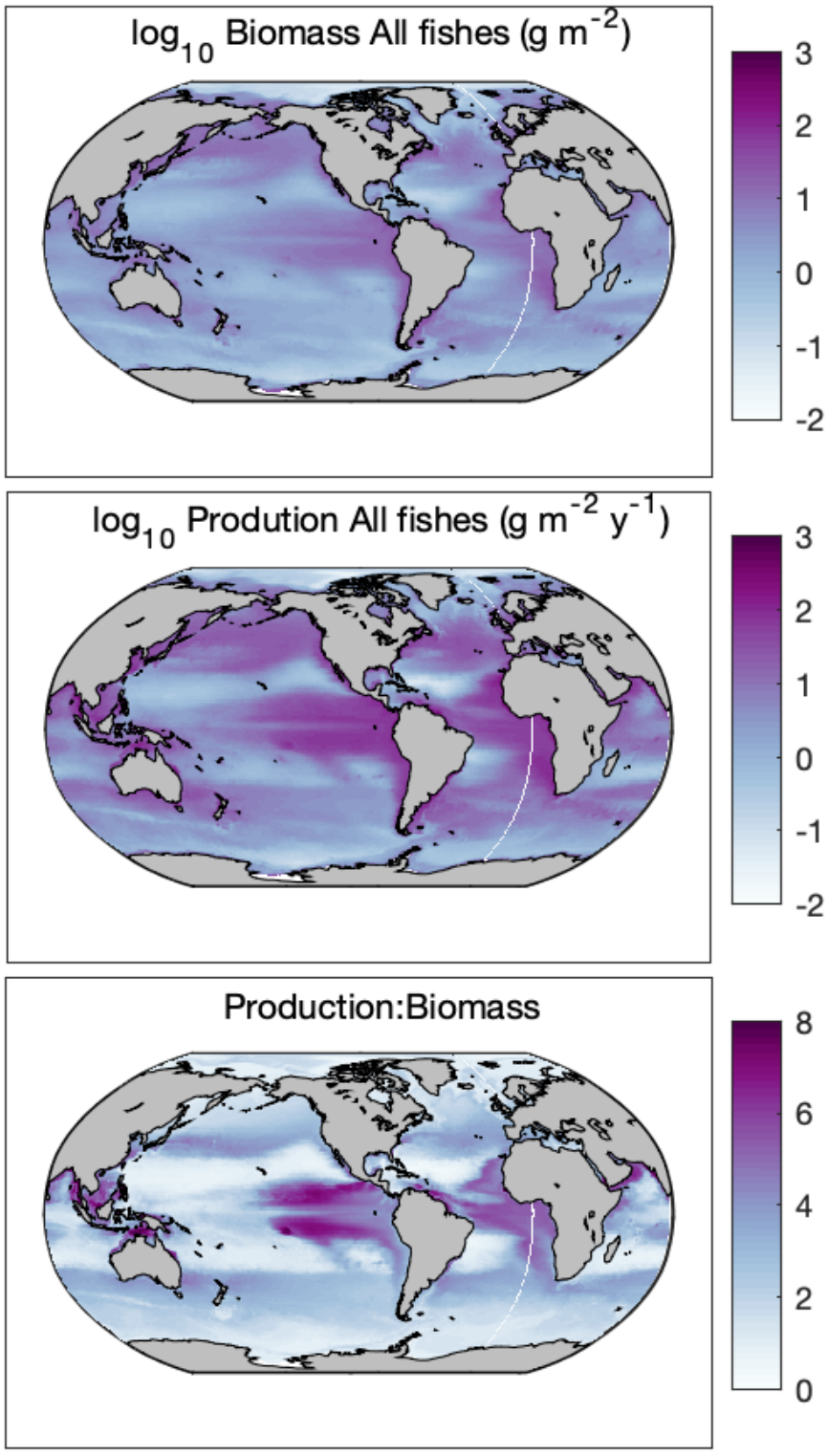

Figure S5. Jennings & Collingridge (2015) comparable plots of (Top) $\log_{10}$ mean biomass of all fishes (g m^{-2}), (Middle) $\log_{10}$ annual production of all fishes (g m^{-2} yr^{-1}), and (Bottom) the Production:Biomass ratio.

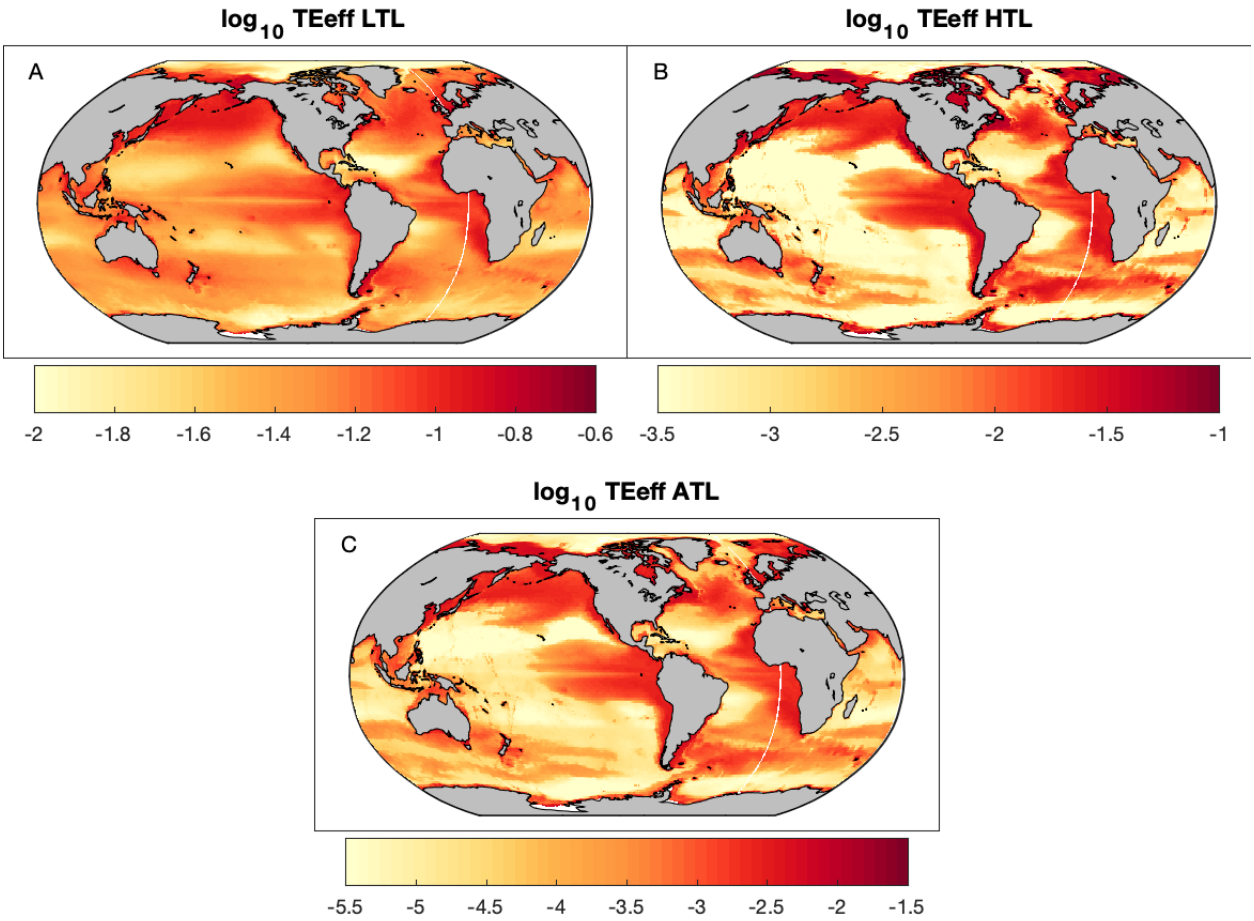

Figure S6. Log_{10} transformed effective transfer efficiency (log_{10} TEeff) (A) of net primary production (NPP) to the lowest trophic levels (LTL; medium zooplankton, large zooplankton, benthos), (B) of LTL production to the highest trophic level (HTL; pelagics and demersals in the large size class), and (C) of NPP to HTL, encompassing all trophic levels (ATL).

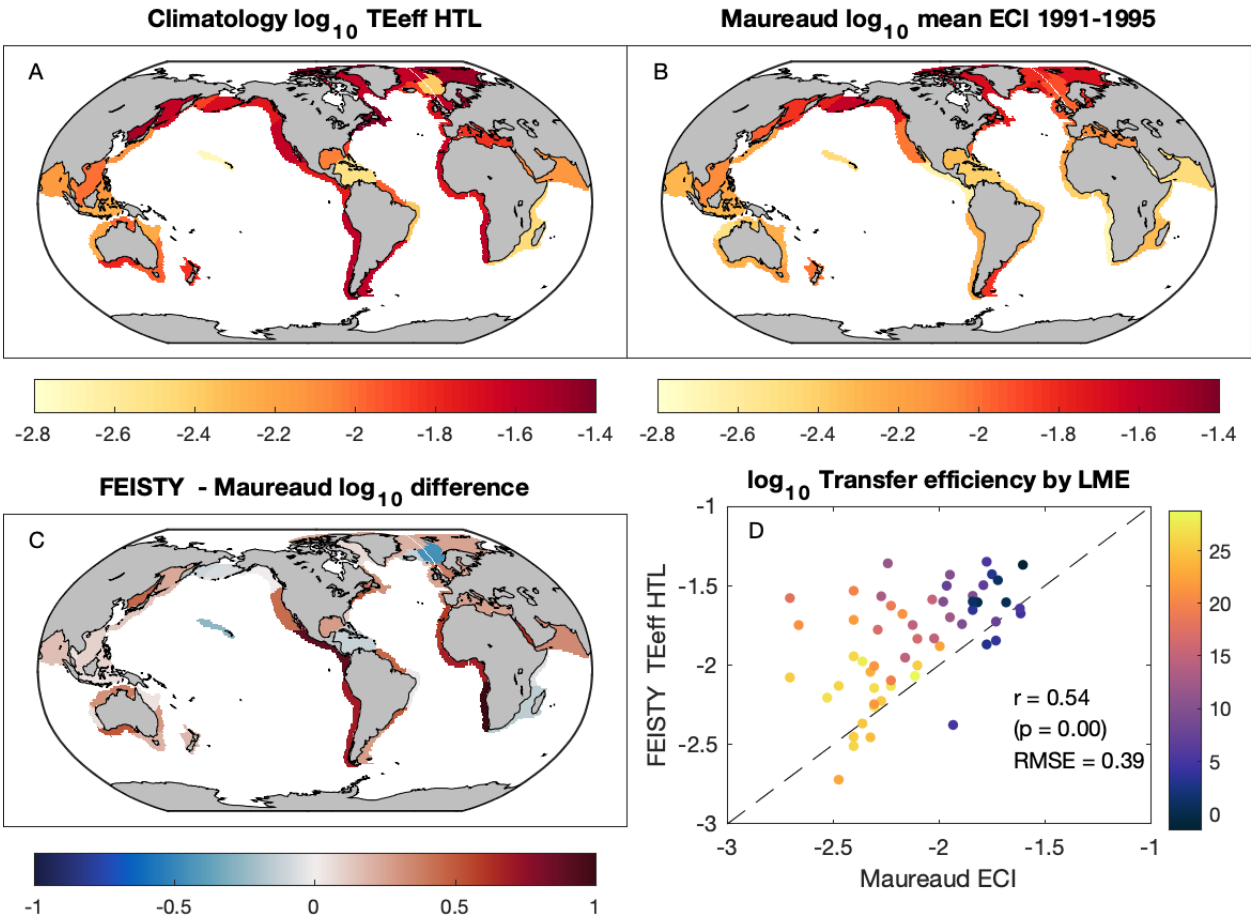

Figure S7. (A) Log_{10} transformed effective transfer efficiency (log_{10} TEeff) of LTL production to the highest trophic level (HTL; pelagics and demersals in the large size class) in FEISTY, (B) the comparable ECI of Maureaud et al. (2017), (C) the difference, and (D) their correlation. Color in D indicates mean pelagic (top 100 m) temperature (ºC) of the LME.