**Supplementary Methods**

As outlined in the main text, models are geostatistical and based on a stochastic partial differential equations (SPDE) mesh. The mesh generated for these models included 200 knots for all models, including null, depth-time only and full models (see Table 1). The general model form can be represented as

$$\begin{matrix}y\_{s,t}&∼Tweedie\left(μ\_{s,t},p,ϕ\right), 1<p<2 ,\\μ\_{s,t}&=exp\left(X\_{s,t}β+ϵ\_{s,m}\right),\\&\\δ\_{m=1}&∼MVNormal(0,Σ\_{ϵ}),\\δ\_{m>1}&=ϕδ\_{t-1}+\sqrt{1-ϕ^{2}}ϵ\_{m}, ϵ\_{m}∼MVNormal\left(0,Σ\_{ϵ}\right),\end{matrix}$$

where $y\_{s,t}$ represents the observed biomass density at a point in space $s$ and time $t$. The index $m $represents a month. The symbol $μ$ represents the mean and $p$ and $ϕ$ represent the Tweedie power and dispersion parameters. The symbol $X\_{s,t}$ represent a vector of predictors for that location in time and $β$ represents a corresponding vector of coefficients; many of the coefficients correspond to basis functions from the smooth terms. The symbol $ϵ\_{s,m}$ represent spatiotemporal random effects drawn from Gaussian Markov random fields with covariance matrices $Σ\_{ω}$ and $Σ\_{ϵ}$. The spatiotemporal random fields are allowed to follow a first order autoregressive structure (AR1) by month. The marginal standard deviation of $ϵ\_{s,m}$is defined as$ σ\_{ϵ}$.