

## 1 Supplementary Material

2 Table S1. Scientific and common names for groundfish species in the West Coast Bottom Trawl  
3 Survey included in our modeling.

Scientific Name	Common name
<i>Albatrossia pectoralis</i>	Giant grenadier
<i>Anoplopoma fimbria</i>	Sablefish
<i>Atheresthes stomias</i>	Arrowtooth flounder
<i>Bathyraja kincaidii</i>	Sandpaper skate
<i>Beringraja rhina</i>	Longnose skate
<i>Chionoecetes tanneri</i>	Tanner crab
<i>Citharichthys sordidus</i>	Pacific sanddab
<i>Coryphaenoides acrolepis</i>	Pacific grenadier
<i>Eopsetta jordani</i>	Petrale sole
<i>Glyptocephalus zachirus</i>	Rex sole
<i>Hippoglossoides elassodon</i>	Flathead sole
<i>Hydrolagus colliei</i>	Spotted ratfish
<i>Lyopsetta exilis</i>	Slender sole
<i>Metacarcinus magister</i>	Dungeness crab
<i>Microstomus pacificus</i>	Dover sole
<i>Ophiodon elongatus</i>	Lingcod
<i>Parophrys vetulus</i>	English sole
<i>Pleuronichthys decurrens</i>	Curlfin sole
<i>Sebastodes alutus</i>	Pacific ocean perch
<i>Sebastodes aurora</i>	Aurora rockfish

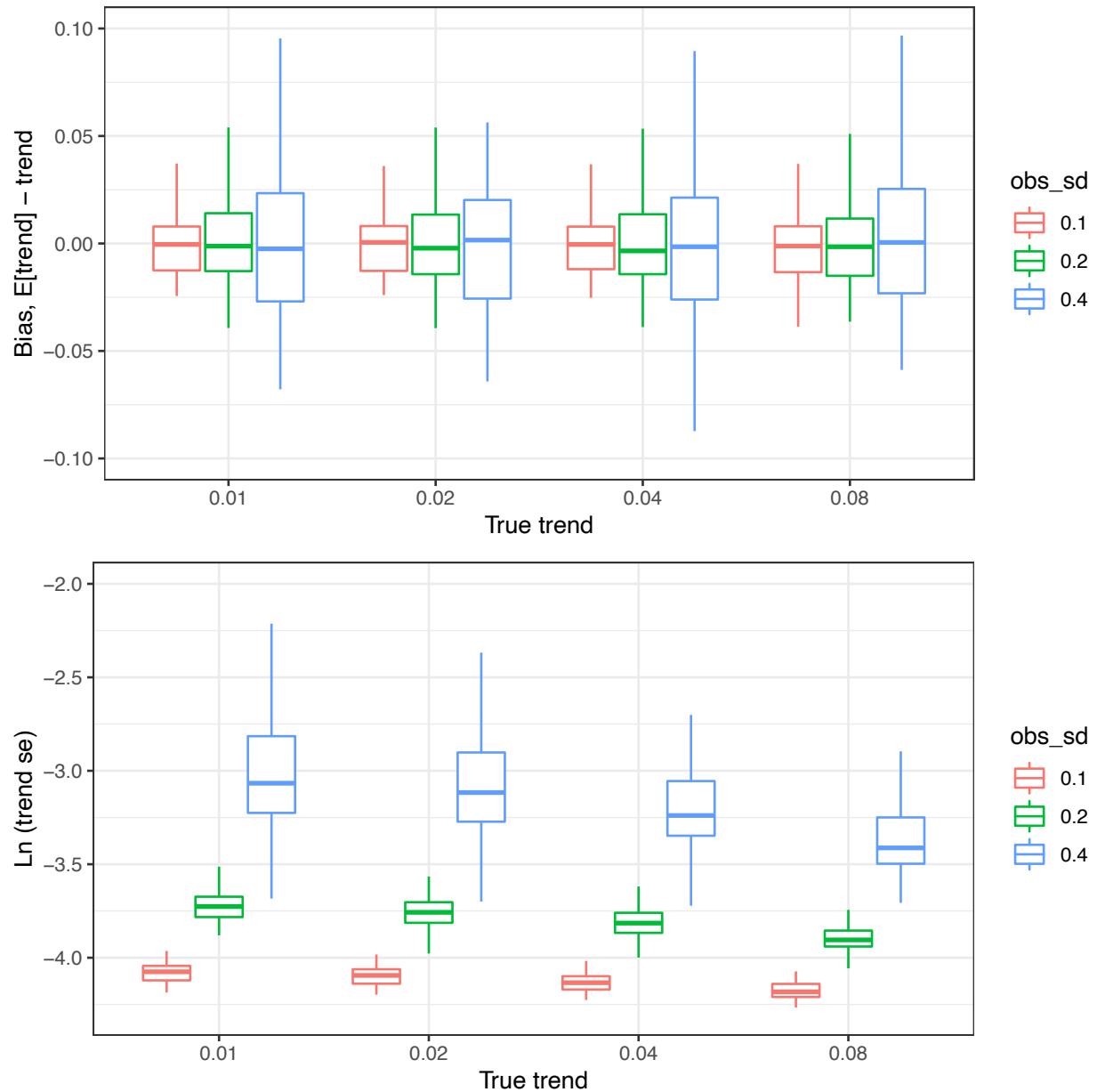
<i>Sebastes babcocki</i>	Redbanded rockfish
<i>Sebastes chlorostictus</i>	Greenspotted rockfish
<i>Sebastes crameri</i>	Darkblotched rockfish
<i>Sebastes diploproa</i>	Splitnose rockfish
<i>Sebastes elongatus</i>	Greenstriped rockfish
<i>Sebastes goodei</i>	Chilipepper rockfish
<i>Sebastes helvomaculatus</i>	Rosethorn rockfish
<i>Sebastes jordani</i>	Shortbelly rockfish
<i>Sebastes melanostomus</i>	Blackgill rockfish
<i>Sebastes paucispinis</i>	Bocaccio
<i>Sebastes saxicola</i>	Stripetail rockfish
<i>Sebastes zacentrus</i>	Sharpchin rockfish
<i>Sebastolobus alascanus</i>	Shortspine thornyhead
<i>Sebastolobus altivelis</i>	Longspine thornyhead
<i>Sebastes semicinctus</i>	Halfbanded rockfish
<i>Squalus suckleyi</i>	North Pacific dogfish

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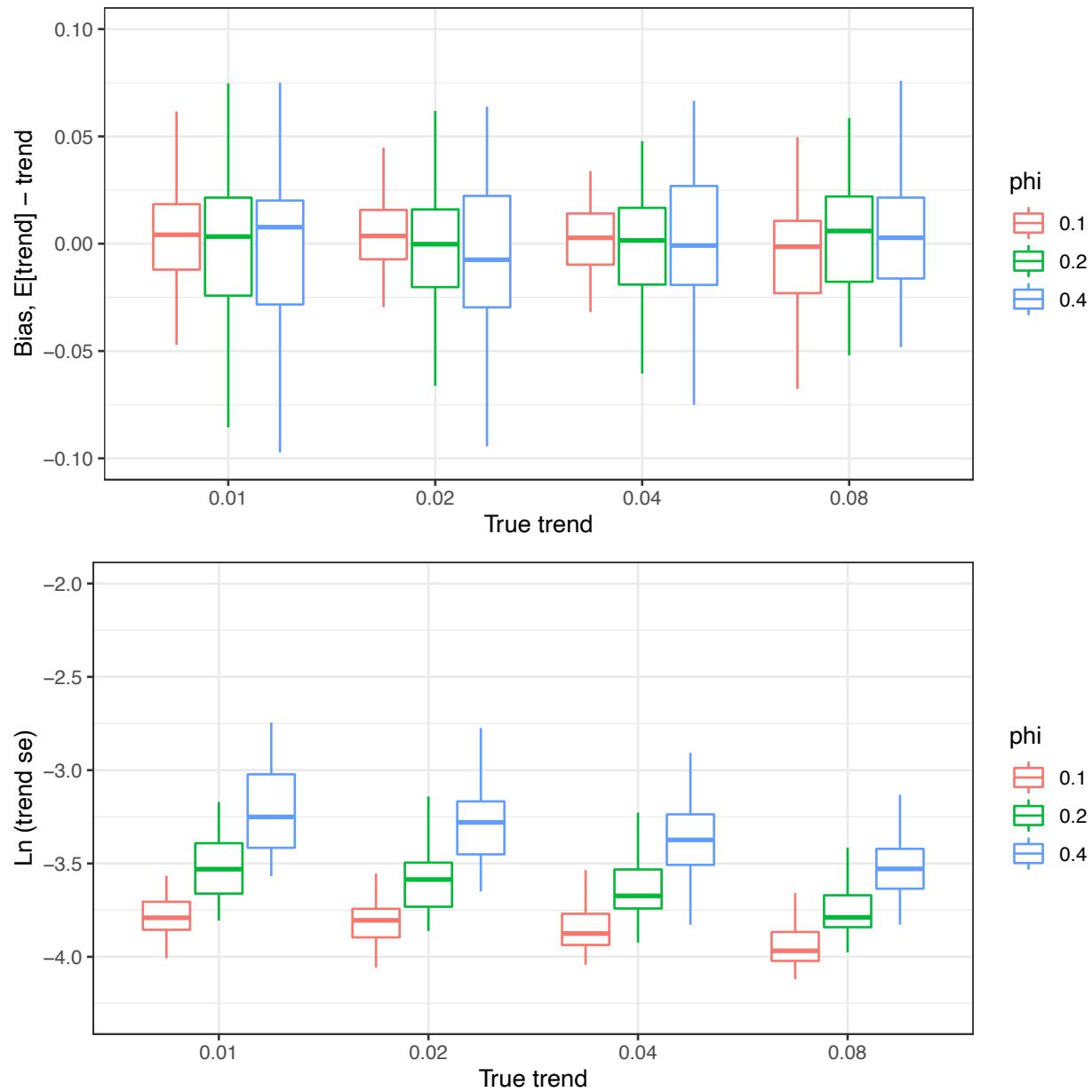
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7 Figure S1. Bias and standard error of the estimated temporal trend of the  $\ln(\text{standard deviation})$   
 8 in simulation results, when data are normally distributed. The bias shows the difference in the  
 9 trend point estimate and the natural log of the trend estimate (bottom panel) captures uncertainty  
 10 in the trend estimate. Each plot includes 3 levels of observation error (increasing observation  
 11 error standard deviation).



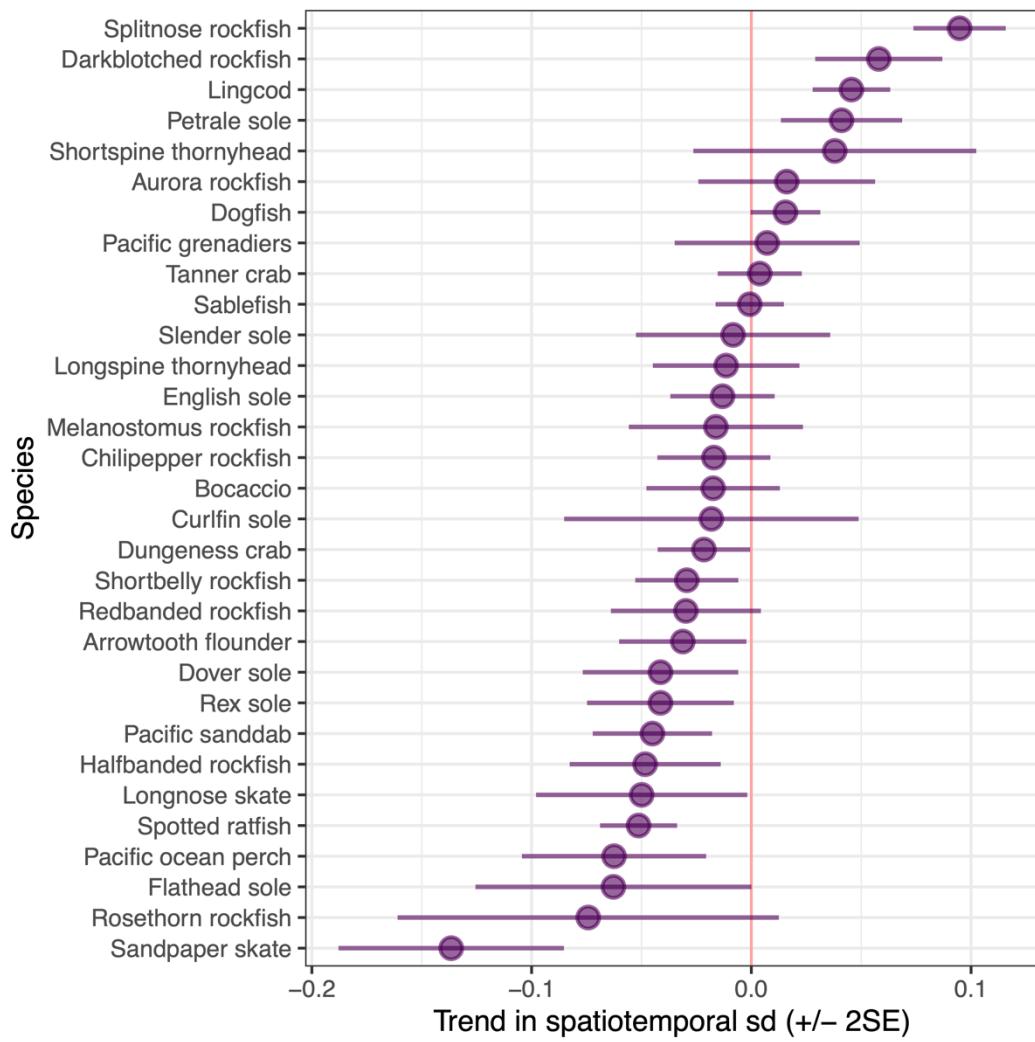
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14 Figure S2. Bias and standard error of the estimated temporal trend of the  $\ln(\text{standard deviation})$   
 15 in simulation results, when data are generated from a Tweedie distribution. The bias shows the  
 16 difference in the trend point estimate and the natural log of the trend estimate (bottom panel)  
 17 captures uncertainty in the trend estimate. Each plot includes 3 levels of observation error  
 18 (increasing Tweedie  $\phi$  parameter).



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24     Figure S3. Unscaled trends in spatiotemporal variation for west coast groundfishes. Trends are  
25     shown as points +/- 2 SEs. Scaled trends are shown in the main text.

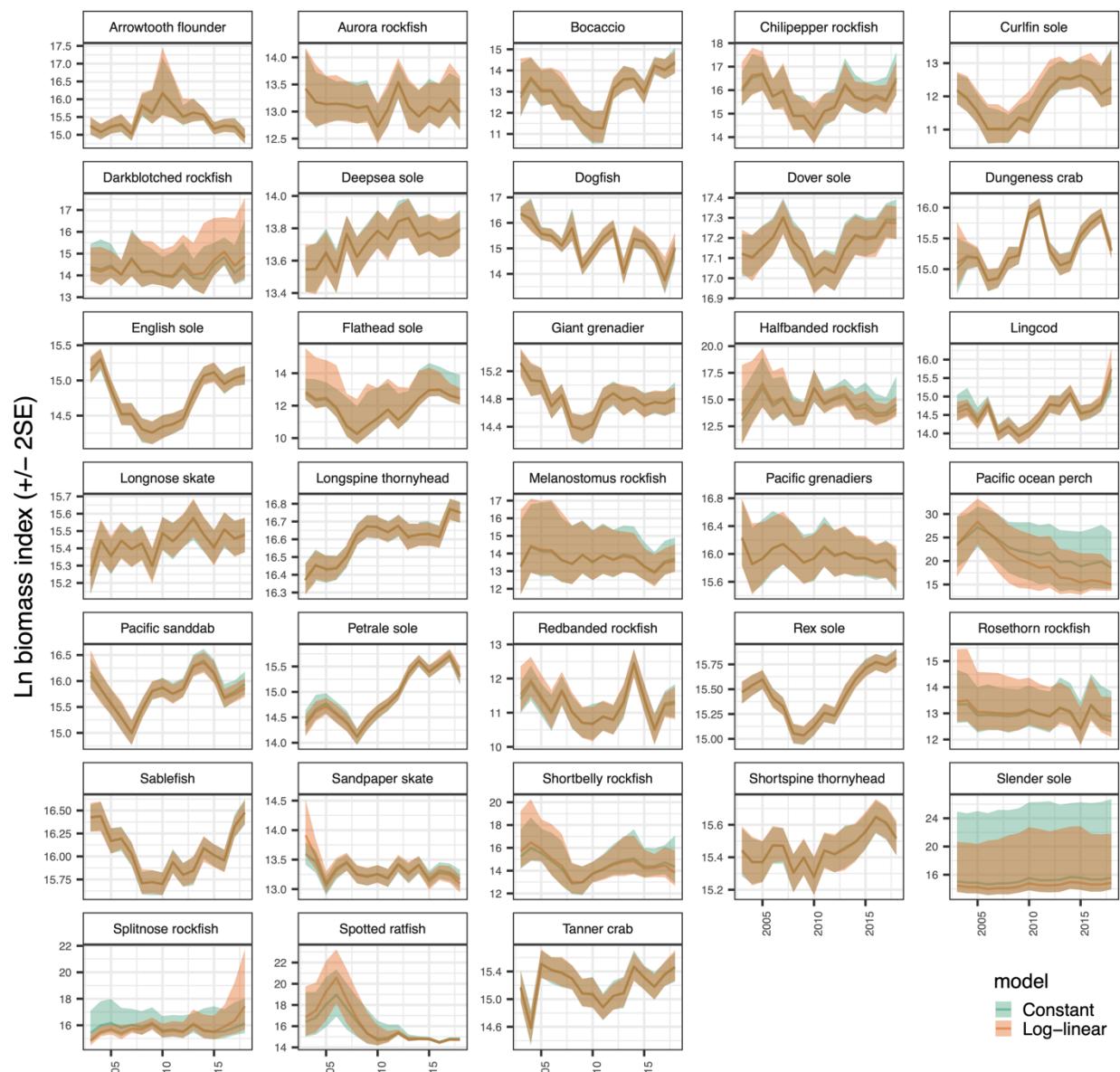


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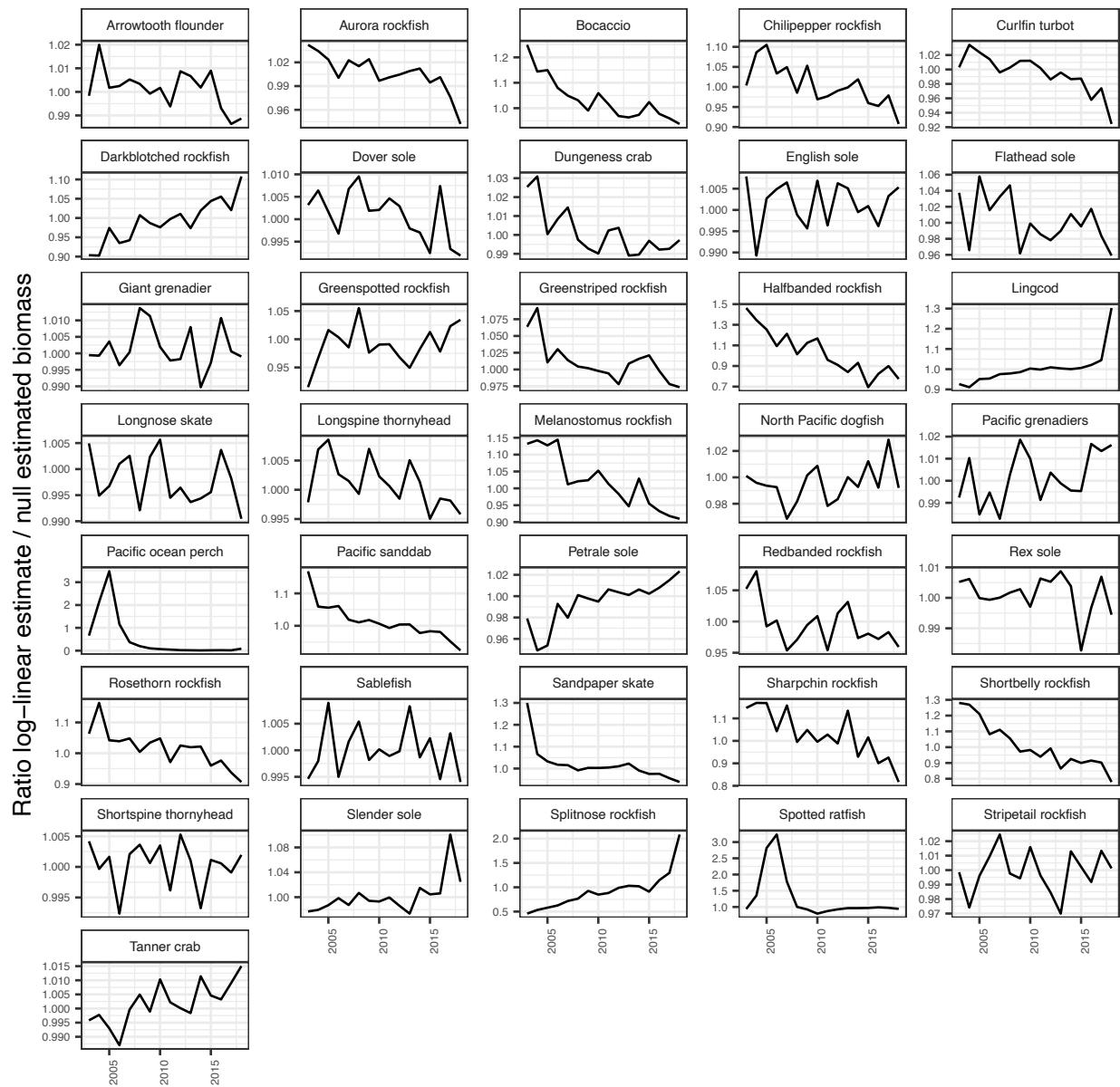
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28 Figure S4. Log biomass temporal trends for all species in our analysis.

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32      Figure S5. Ratios of mean biomass from log-linear model to mean biomass from null  
 33      spatiotemporal model with constant variance.

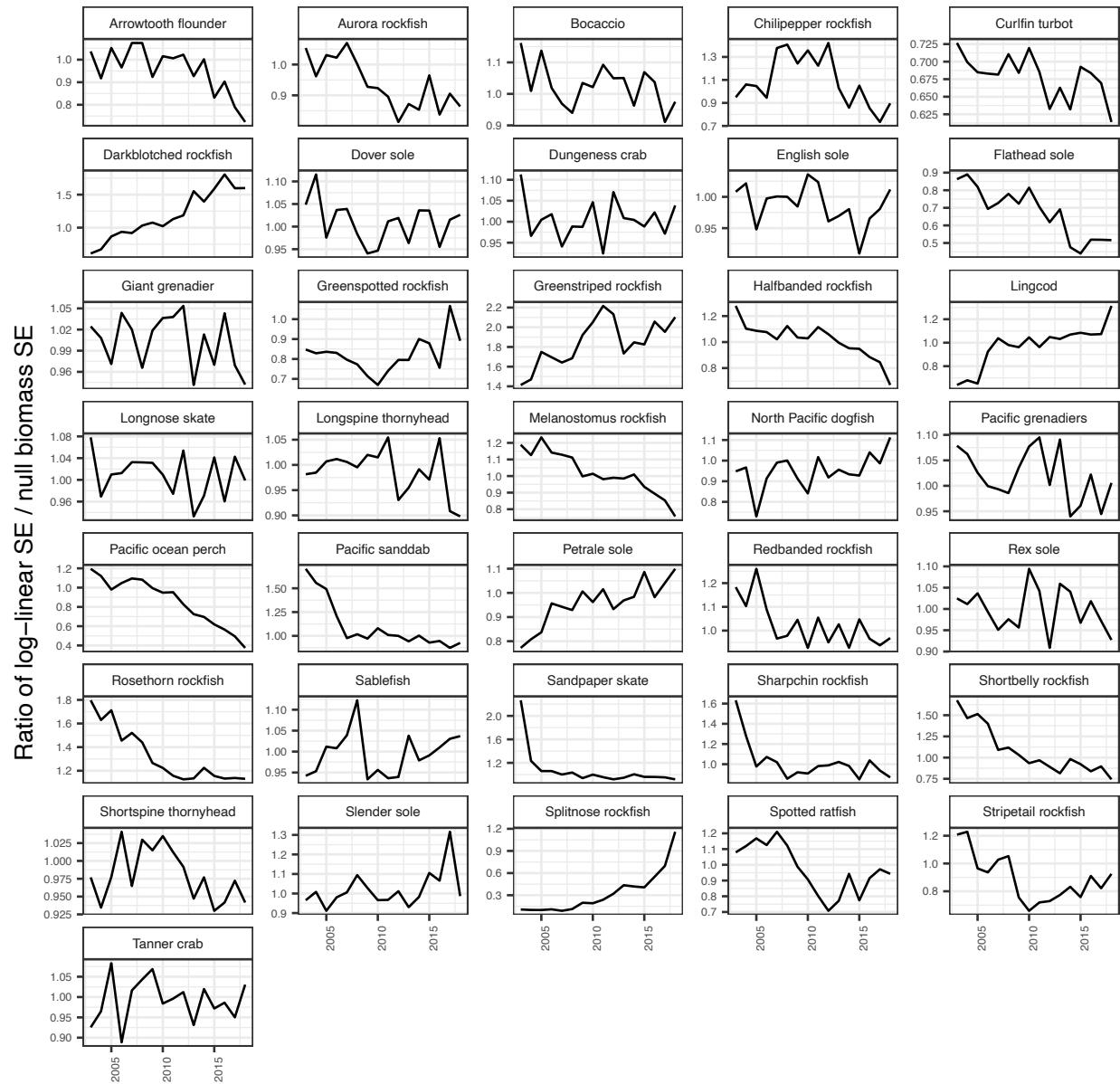


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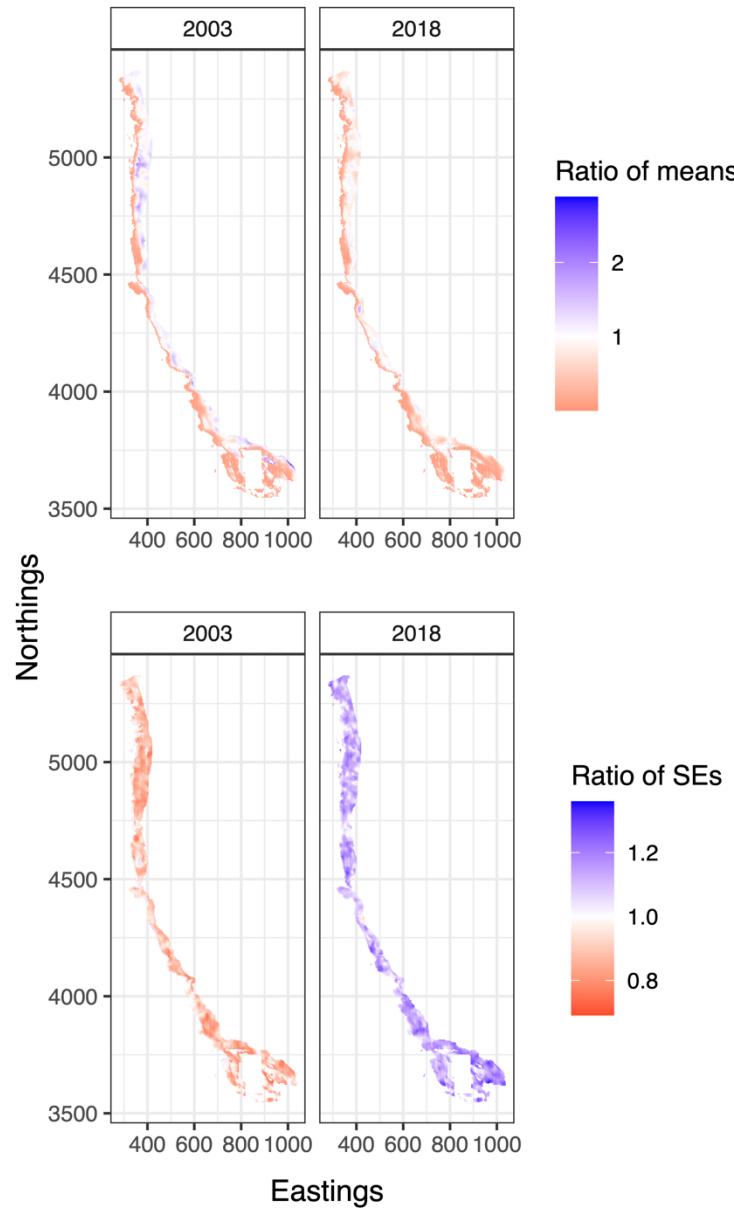
37      Figure S6. Ratios of standard errors from log-linear model to null spatiotemporal model with  
 38      constant variance.



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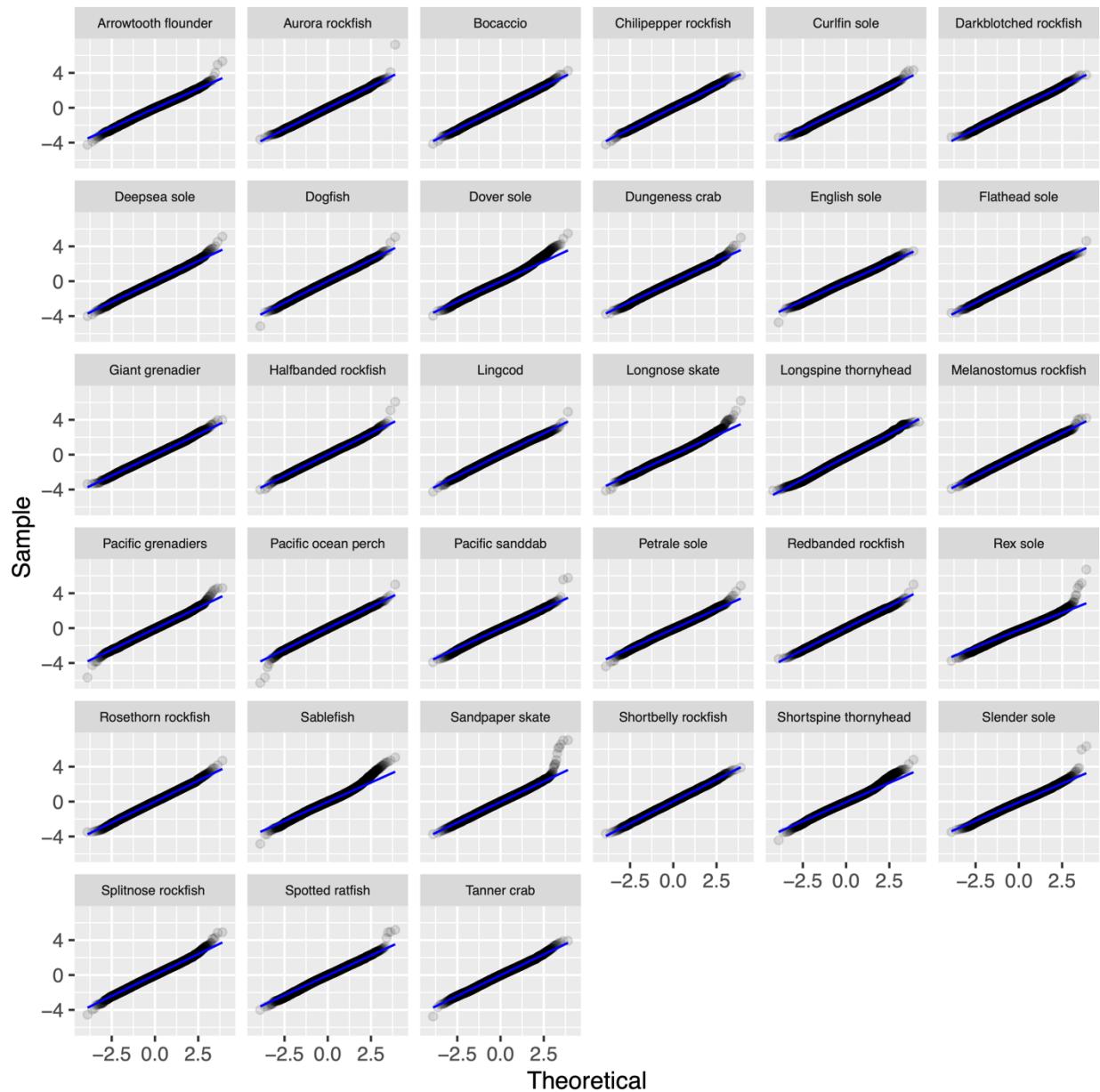
41 Figure S7. Ratios of biomass, and ratio of standard errors on biomass predictions from the null  
42 spatiotemporal model and log-linear spatiotemporal model applied to lingcod (*O. elongatus*). In  
43 both cases, the ratio is calculated as the estimate from the log-linear model divided by the  
44 estimate from the null model.



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47 Figure S8. Example of randomized-quantile QQ (quantile-quantile) diagnostic plots from  
 48 estimates using the model with a log-linear trend and residuals done using multivariate normal  
 49 draws from the estimated variance-covariance matrix.



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