

1 *Supporting Information Appendix*

2 **Higher mortality rates leave heated ecosystem with similar size-**  
3 **structure despite larger, younger, and faster growing fish**

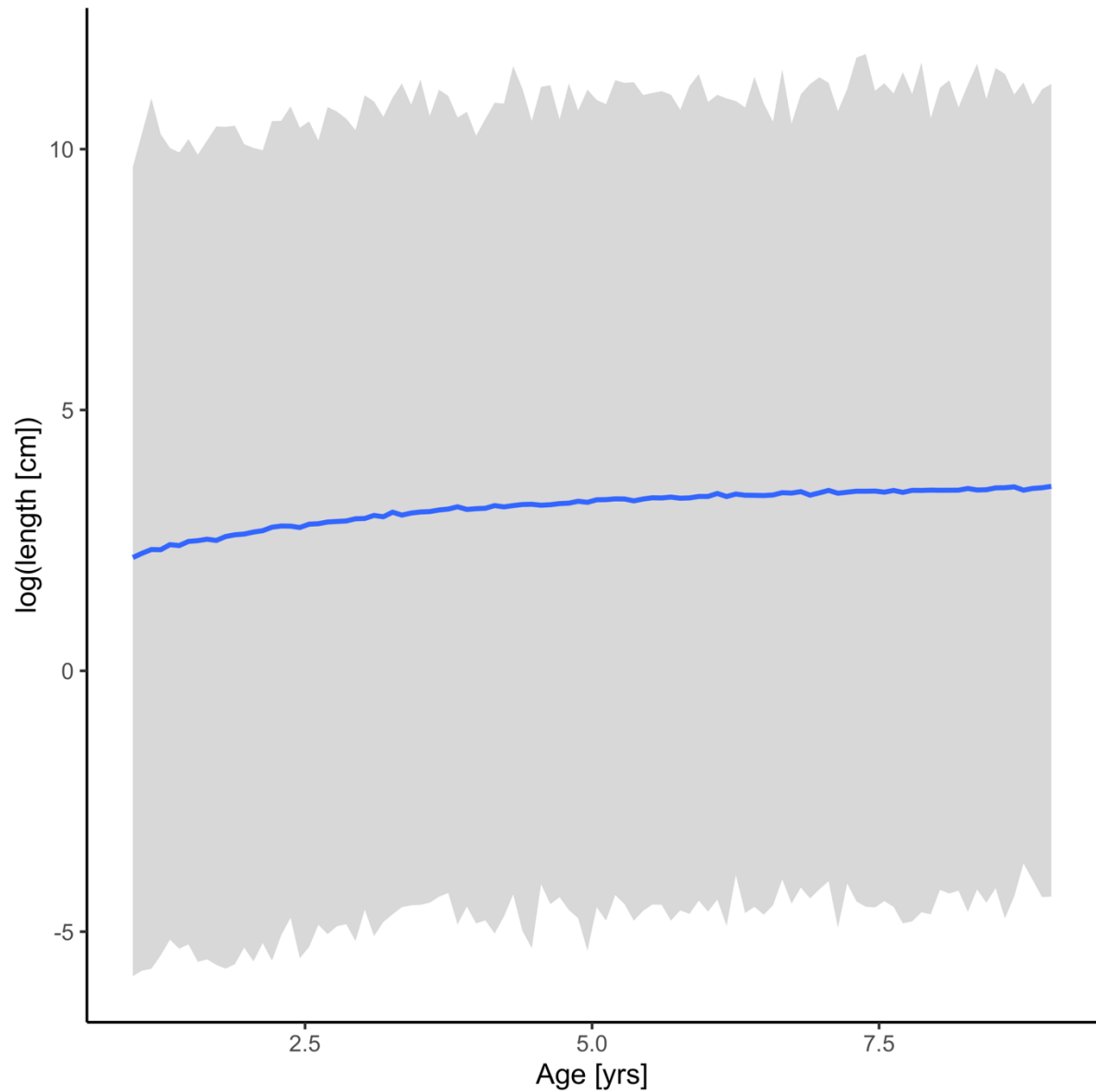
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13 Resources, Institute of Marine Research, Turistgatan 5, 453 30 Lysekil, Sweden, Tel.:  
14 +46(0)104784137, email: max.lindmark@slu.se

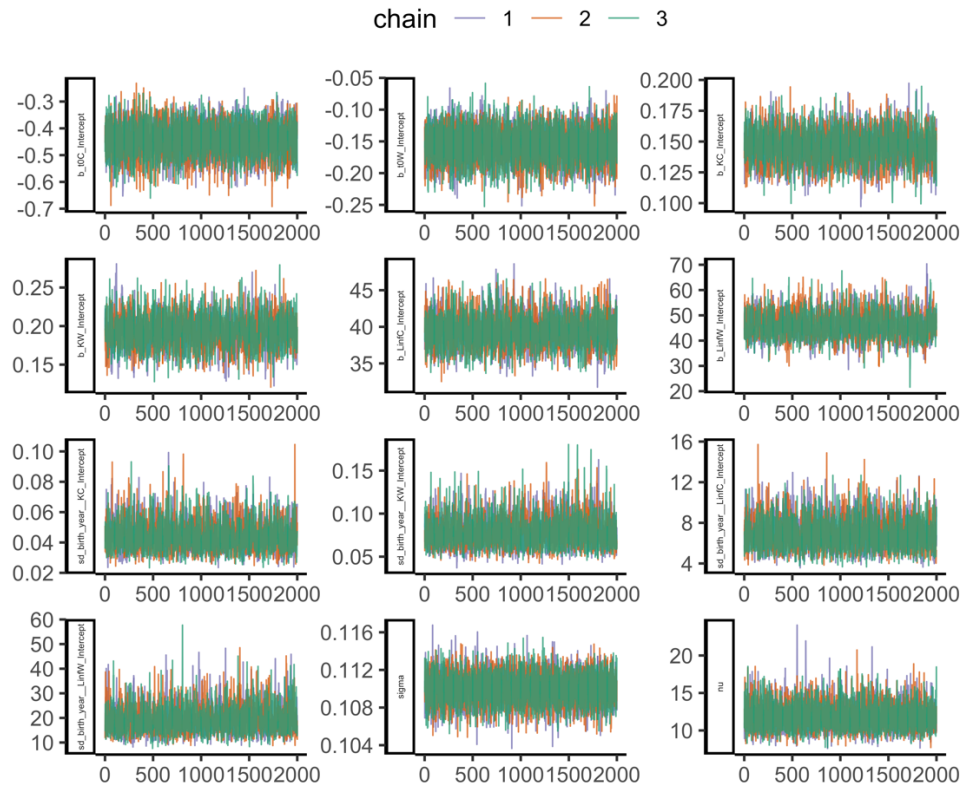


**Fig. S1.** Prior predictive distribution for the von Bertalanffy growth equation (posterior draws from the prior only, ignoring the likelihood). The solid line is the median and the shaded area is the 95% credible intervals.

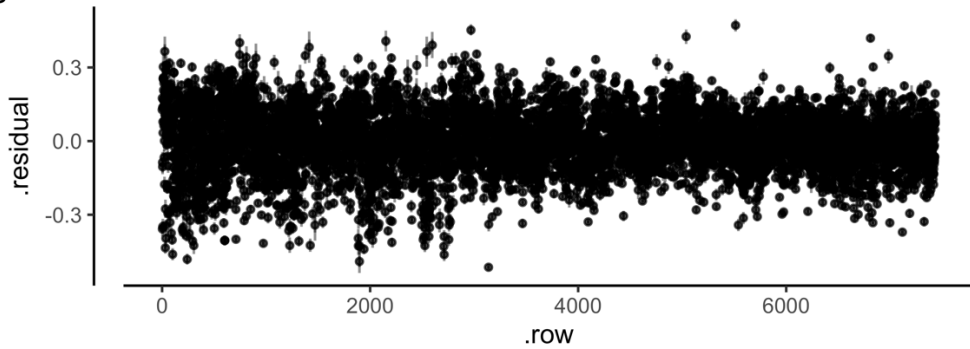
**Table S1.** Comparison of von Bertalanffy growth models with different combinations of shared and area-specific parameters (ordered by difference in expected log pointwise density (elpd) from the best model). Note that in all models,  $L_{\infty j}$  and  $K_j$  vary among cohorts.

| Model Name | Model structure                                       | elpd_diff |
|------------|---|-----------|
| M1         | Area-specific $L_{\infty j}$ , $K_j$ and $t_0$        | 0         |
| M4         | Area-specific $L_{\infty j}$ and $K_j$ , common $t_0$ | -9        |
| M2         | Area-specific $K_j$ , common $t_0$ and $L_{\infty j}$ | -111      |
| M3         | Area-specific $t_0$ and $L_{\infty j}$ , common $K_j$ | -150.5    |
| M7         | Area-specific $L_{\infty j}$ , common $K_j$ and $t_0$ | -157.7    |
| M6         | Area-specific $K_j$ , common $t_0$ and $L_{\infty j}$ | -173.9    |
| M5         | Area-specific $t_0$ , common $K_j$ and $L_{\infty j}$ | -1337.5   |
| M8         | Common $t_0$ , $K_j$ and $L_{\infty j}$               | -2153.8   |

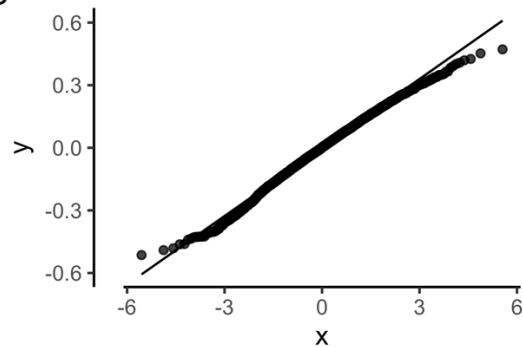
A



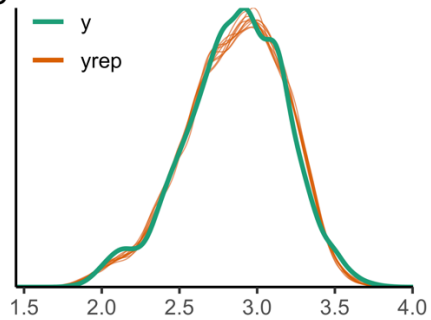
B



C

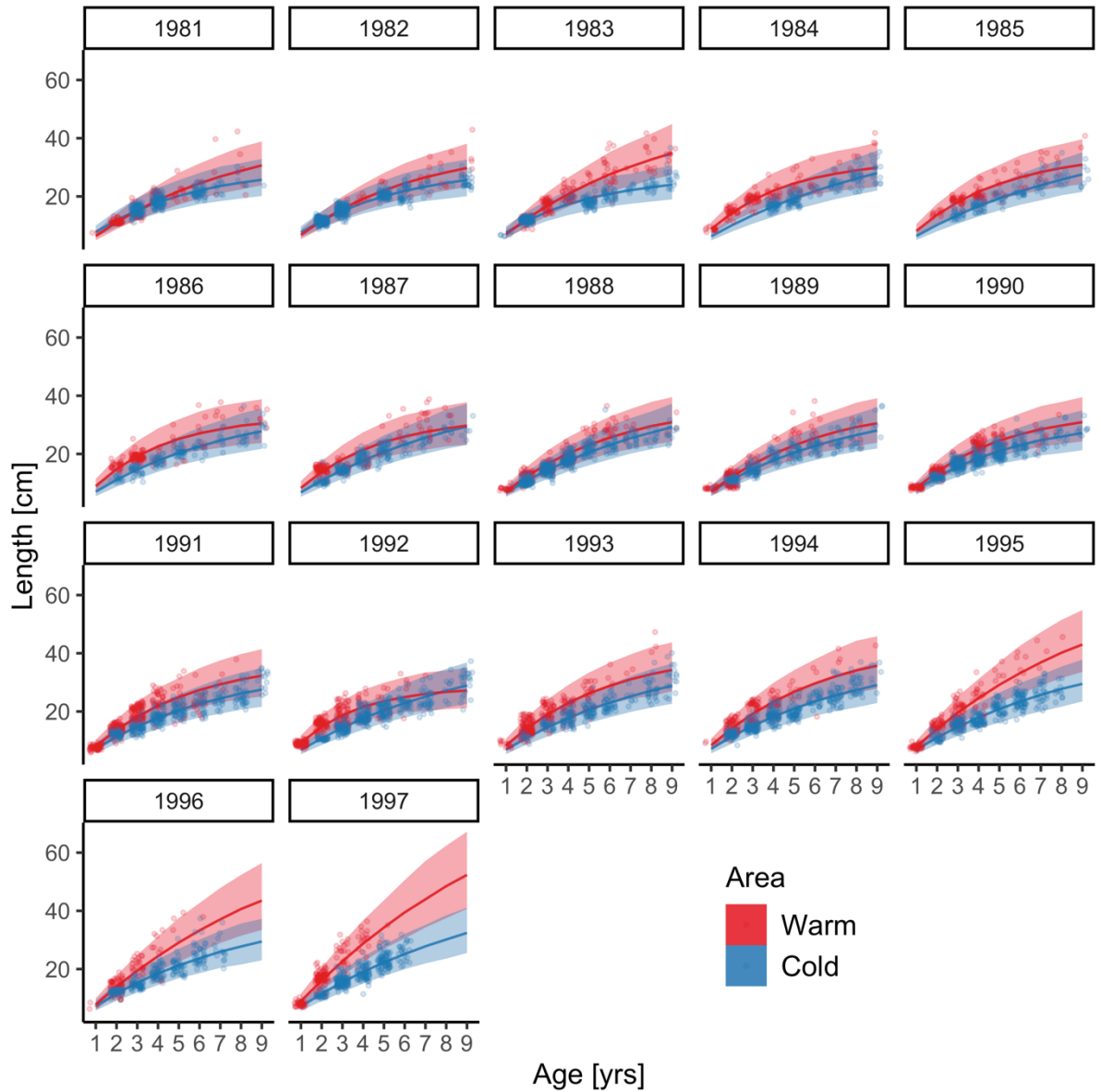


D

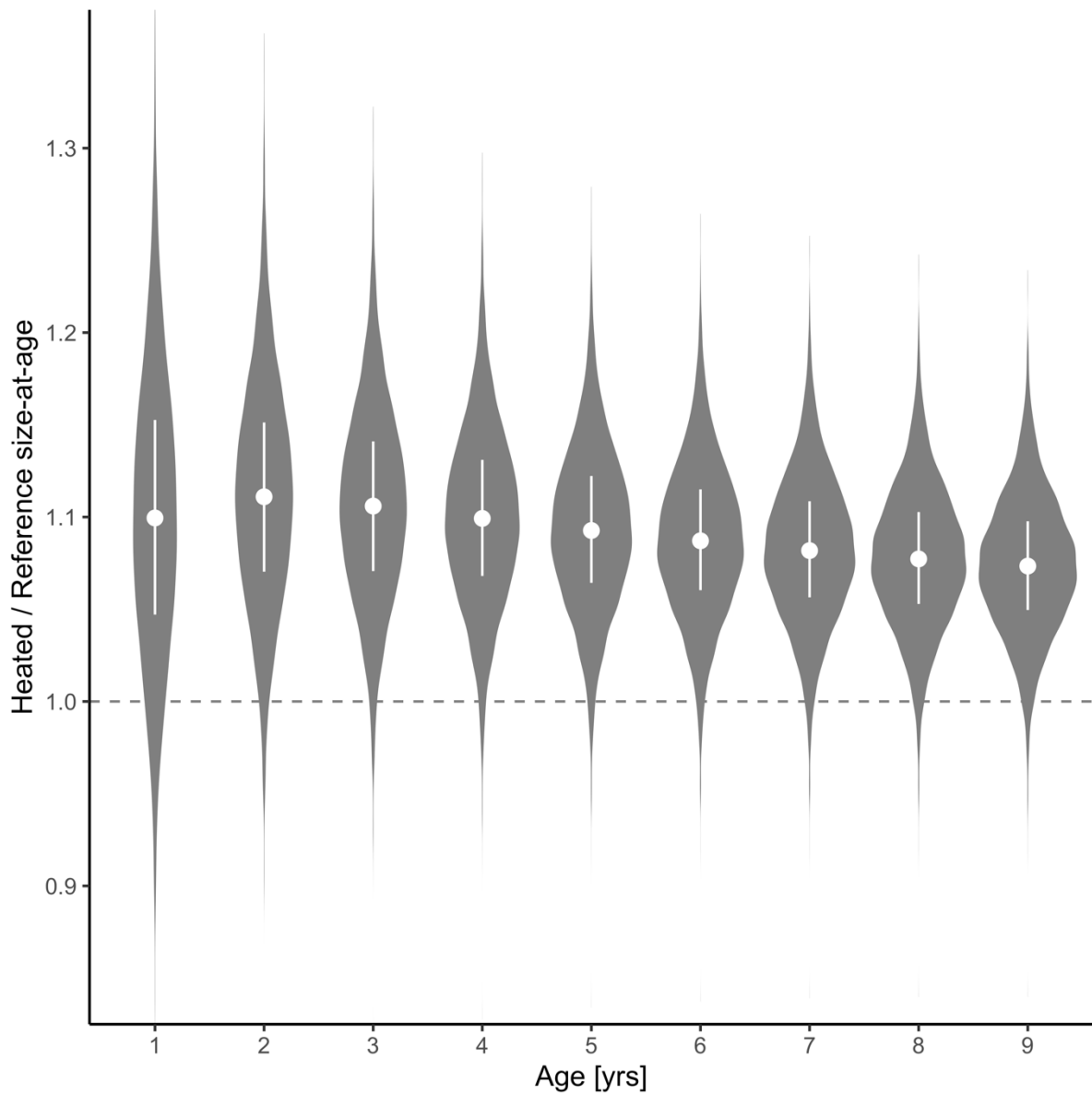


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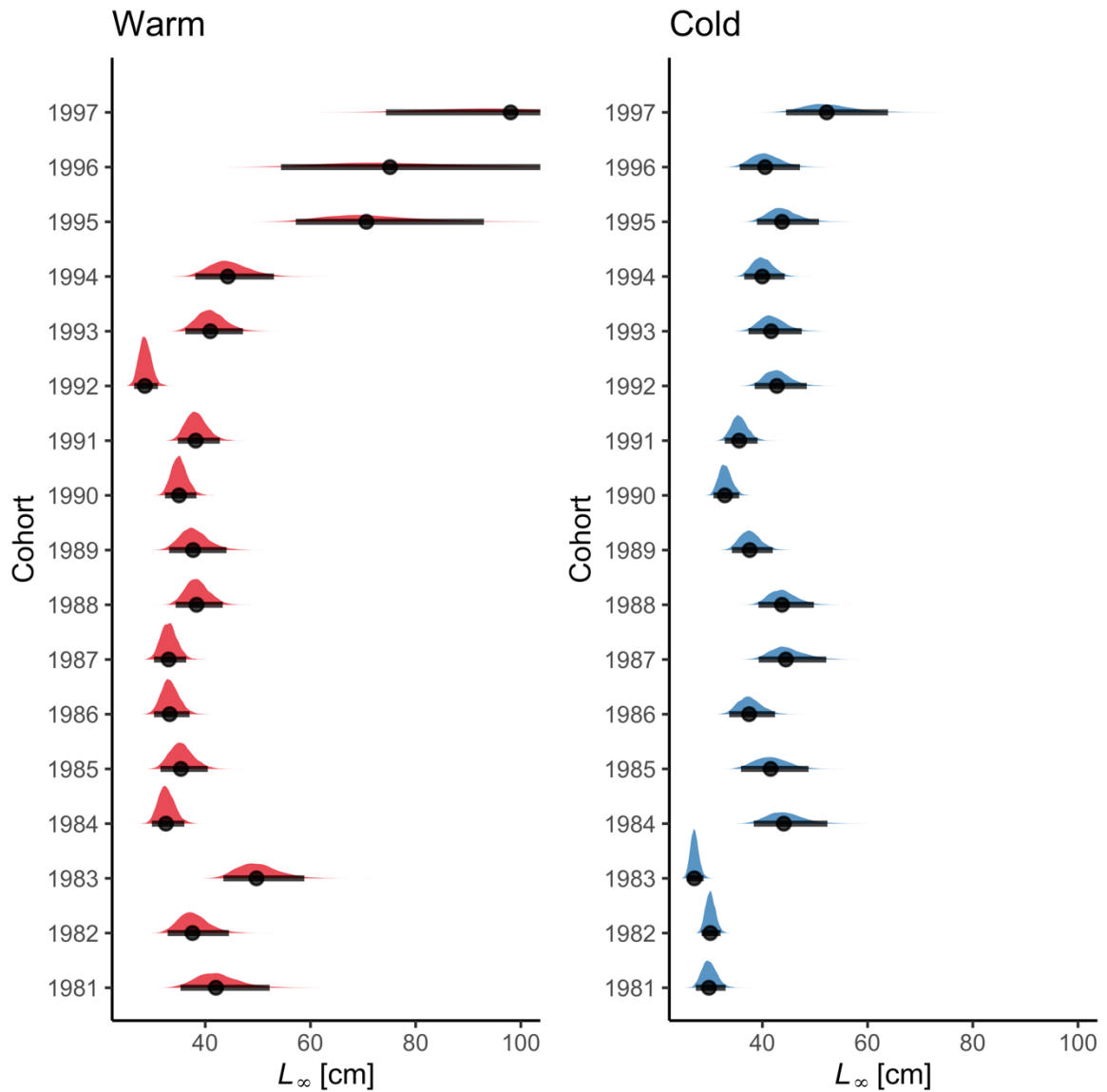
46 **Fig. S2.** The best model of the von Bertalanffy growth equation: (A) traceplot to illustrate chain  
 47 convergence for key (population-level) parameters, (B) residuals, (C) QQ-plot and (D)  
 48 posterior predictive check (D).



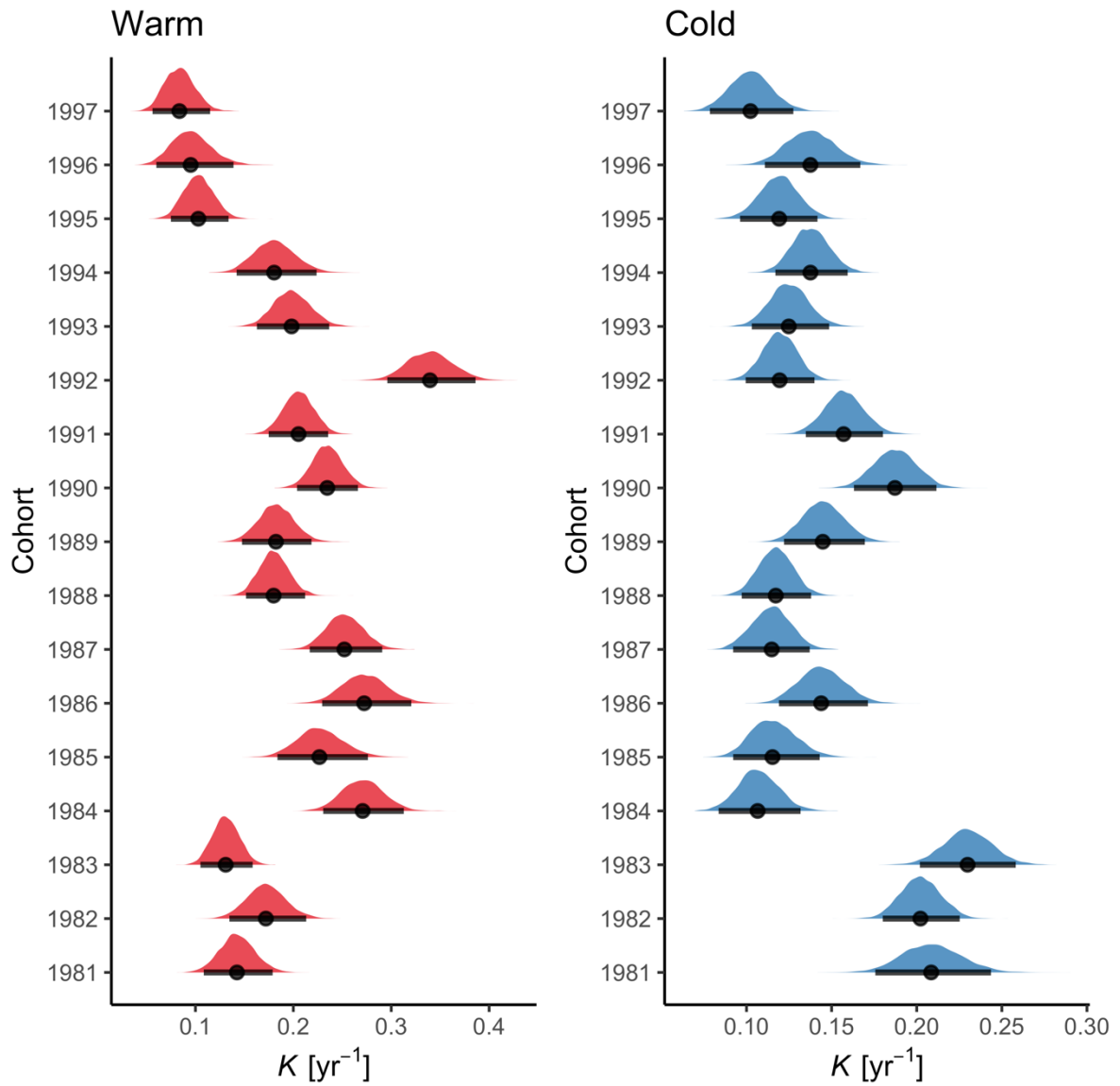
**Fig. S3.** Cohort-specific predictions from the best von Bertalanffy model (i.e., with cohort-varying  $L_{\infty}$  and  $K$ ). Points correspond to data; solid lines correspond to the median of the posterior prediction from the model and the shaded area corresponds to the 95% credible interval.



**Fig. S4.** The average length-at-age is larger for fish of all ages in the heated enclosed bay compared to the reference area, and the relative difference declines very slightly with age. Violin plots depict size-at-age in the heated relative to the reference area, based on draws from expectation of the posterior predictive distribution (without random effects). The points and vertical lines depict the median and the interquartile range.

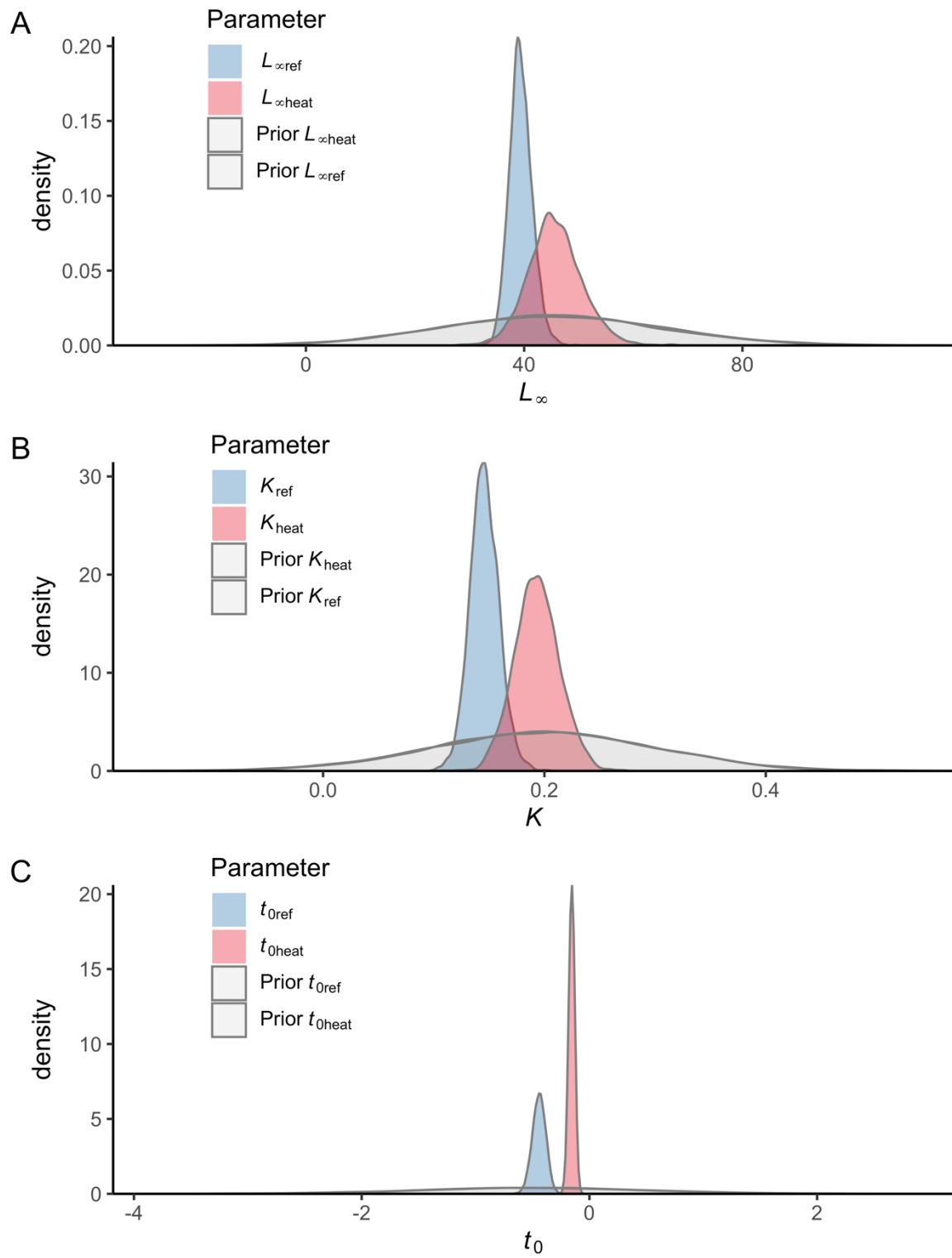


**Fig. S5.** Posterior distributions of the cohort-varying  $L_{\infty}$  parameter in the best von Bertalanffy growth model. Points correspond to the median and the horizontal lines correspond to the 95% credible interval. Note that the distributions of  $L_{\infty}$  in the warm areas extend beyond the x-axis for cohorts 1995–1997 (also evident in Fig. S3). The range of the x-axis was set to be wide enough to include the posterior medians of the larger estimates but narrow enough to allow for comparison between the other cohorts and areas.

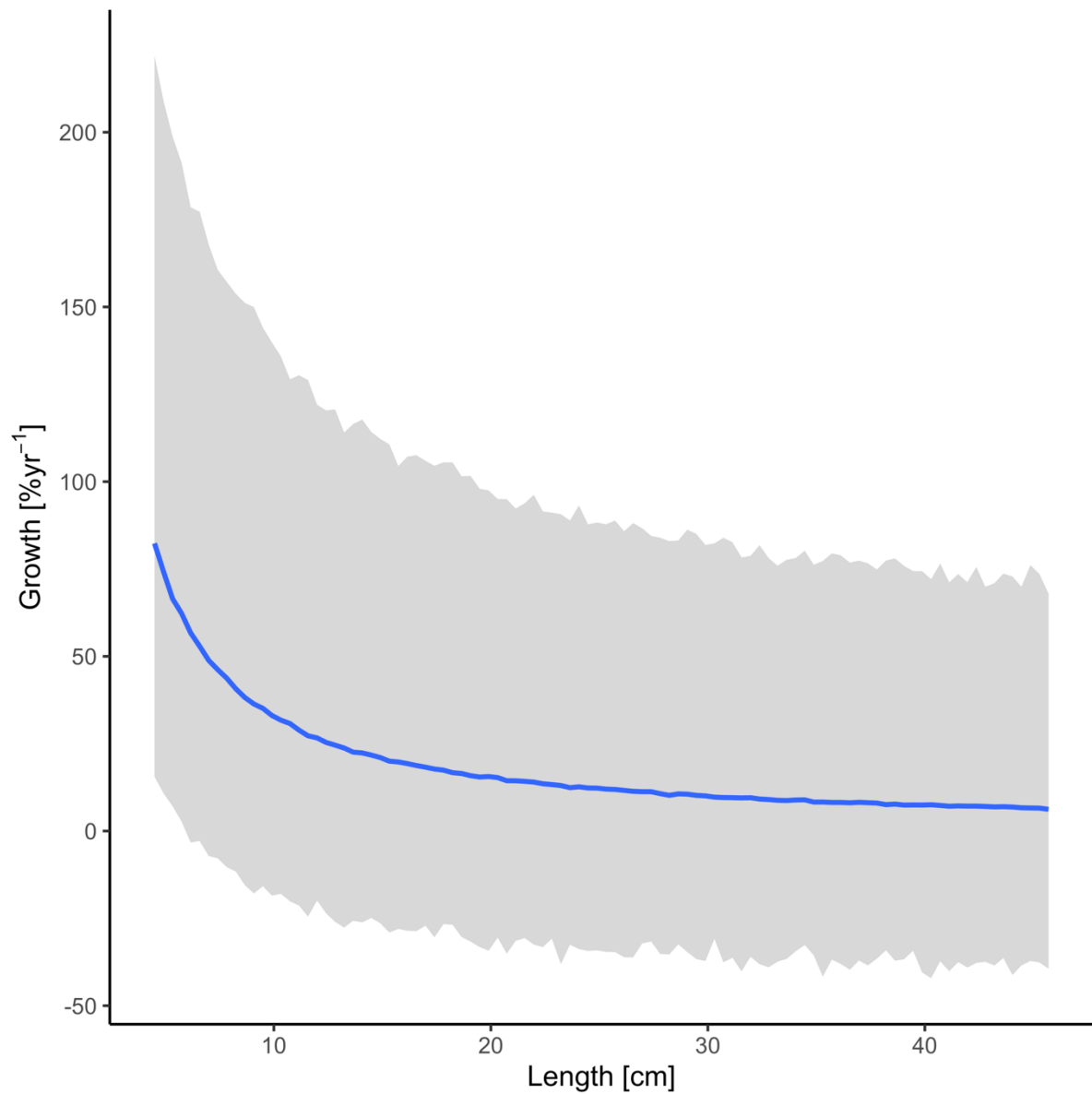


**Fig. S6.** Posterior distributions of the cohort-varying  $K$  parameter in the von Bertalanffy model. Points correspond to the median and the horizontal lines correspond to the 95% credible interval.





**Fig. S7.** Prior vs posterior distributions for parameters  $L_{\infty}$  (A),  $K$  (B) and  $t_0$  (C) in the best model of the von Bertalanffy growth equation.

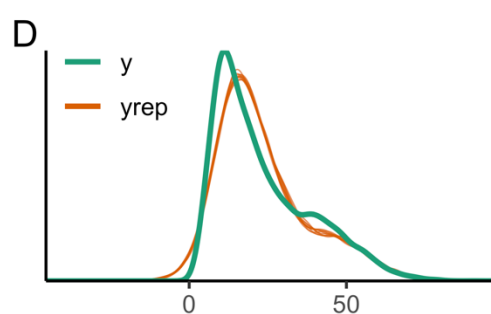
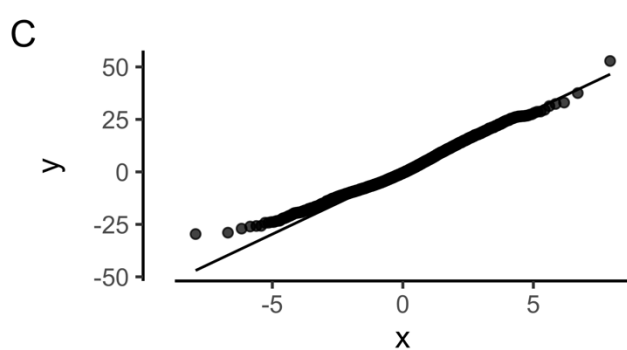
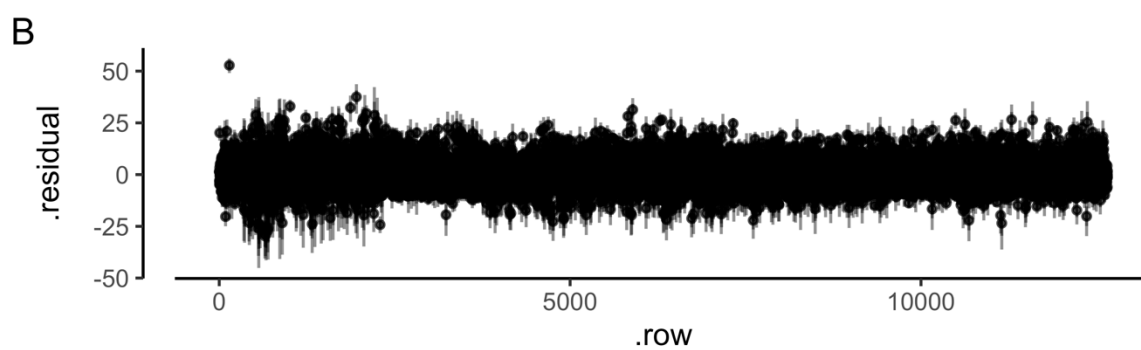
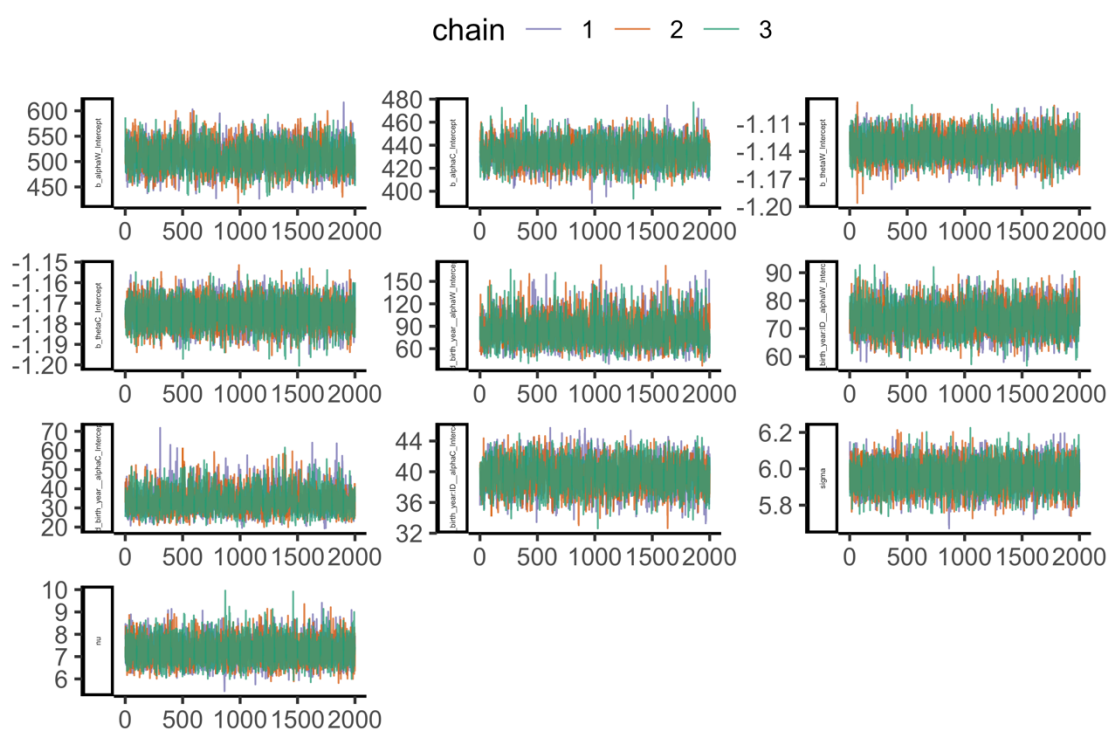


**Fig. S8.** Prior predictive distribution for the allometric growth model (posterior draws from the prior only, ignoring the likelihood). The solid line is the median and the shaded area is the 95% credible intervals.

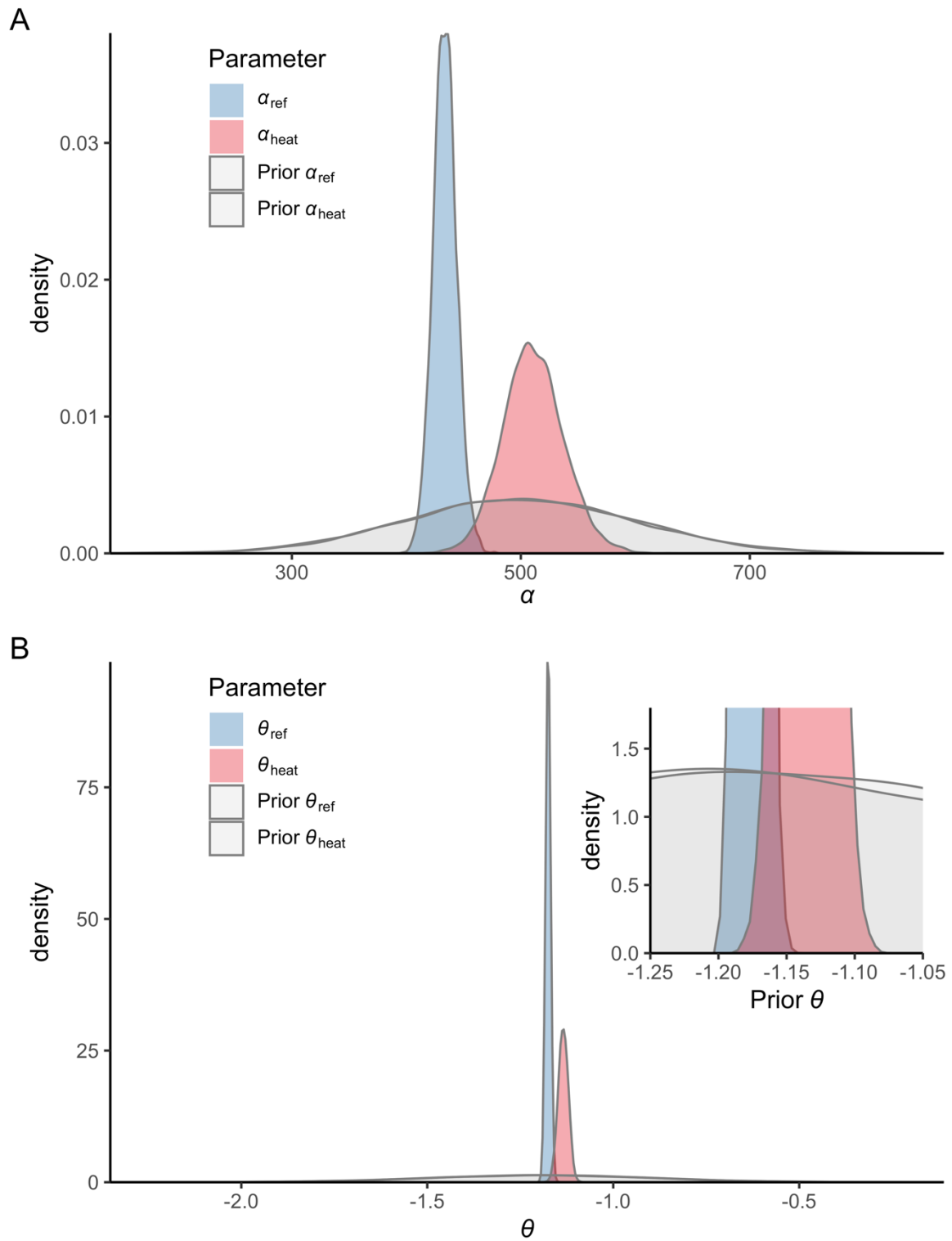
**Table S2.** Comparison of allometric growth models with common or unique  $\theta$ -parameter (exponent in the allometric growth model), ordered by difference in expected log pointwise density (elpd) from the best model.

| Model Name | Model structure  | elpd_diff |
|------------|--|-----------|
| M1         | Intercept ( $\alpha_{j[i],k[i]}$ ) varying across individuals within cohorts, fixed, area-specific slope ( $\theta_{ref}, \theta_{heat}$ ) | 0         |
| M2         | Intercept ( $\alpha_{j[i],k[i]}$ ) varying across individuals within cohorts, “fixed” common slope ( $\theta$ )                            | -2.7      |

A

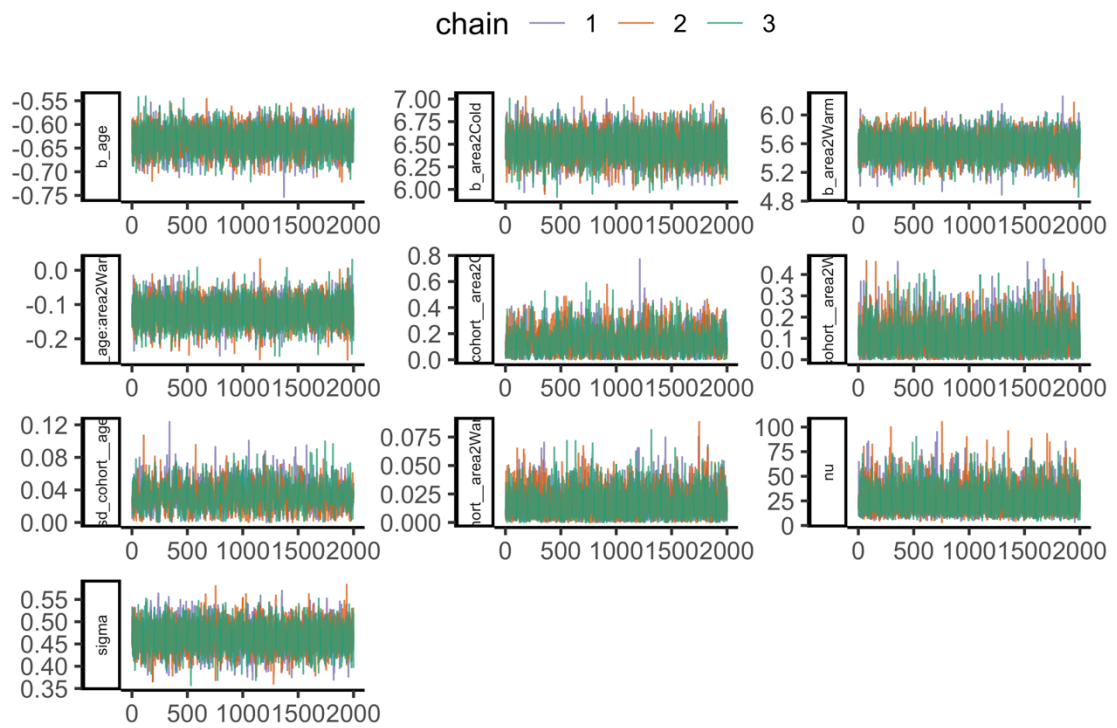


**Fig. S9.** The best allometric growth model: (A) traceplot to illustrate chain convergence for key (population-level) parameters, (B) residuals, (C) QQ-plot and (D) posterior predictive check (D).

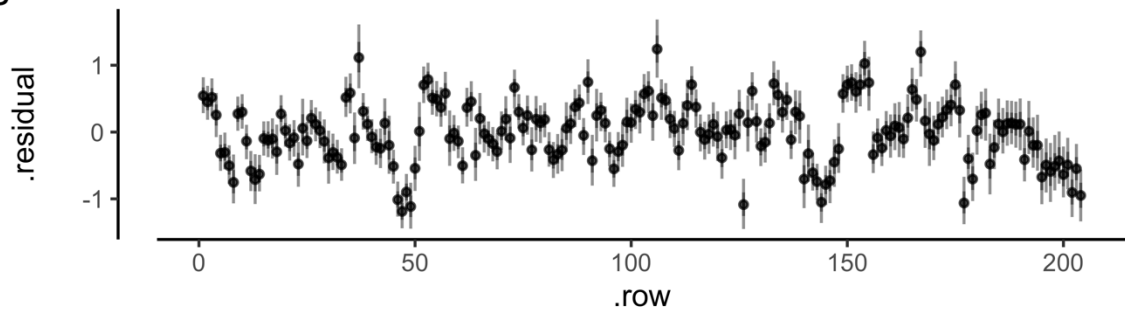


**Fig. S10.** Prior vs posterior distributions for parameters  $\alpha$  (A) and  $\theta$  (B) in the best allometric growth model (inset in panel (B) is a zoomed-in version to better visualize the priors in the range of the posteriors).

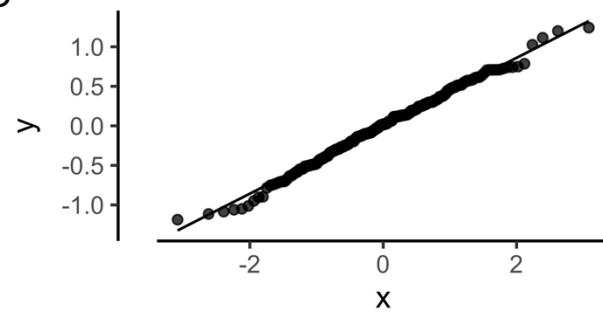
A



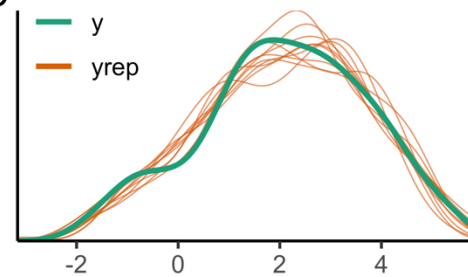
B



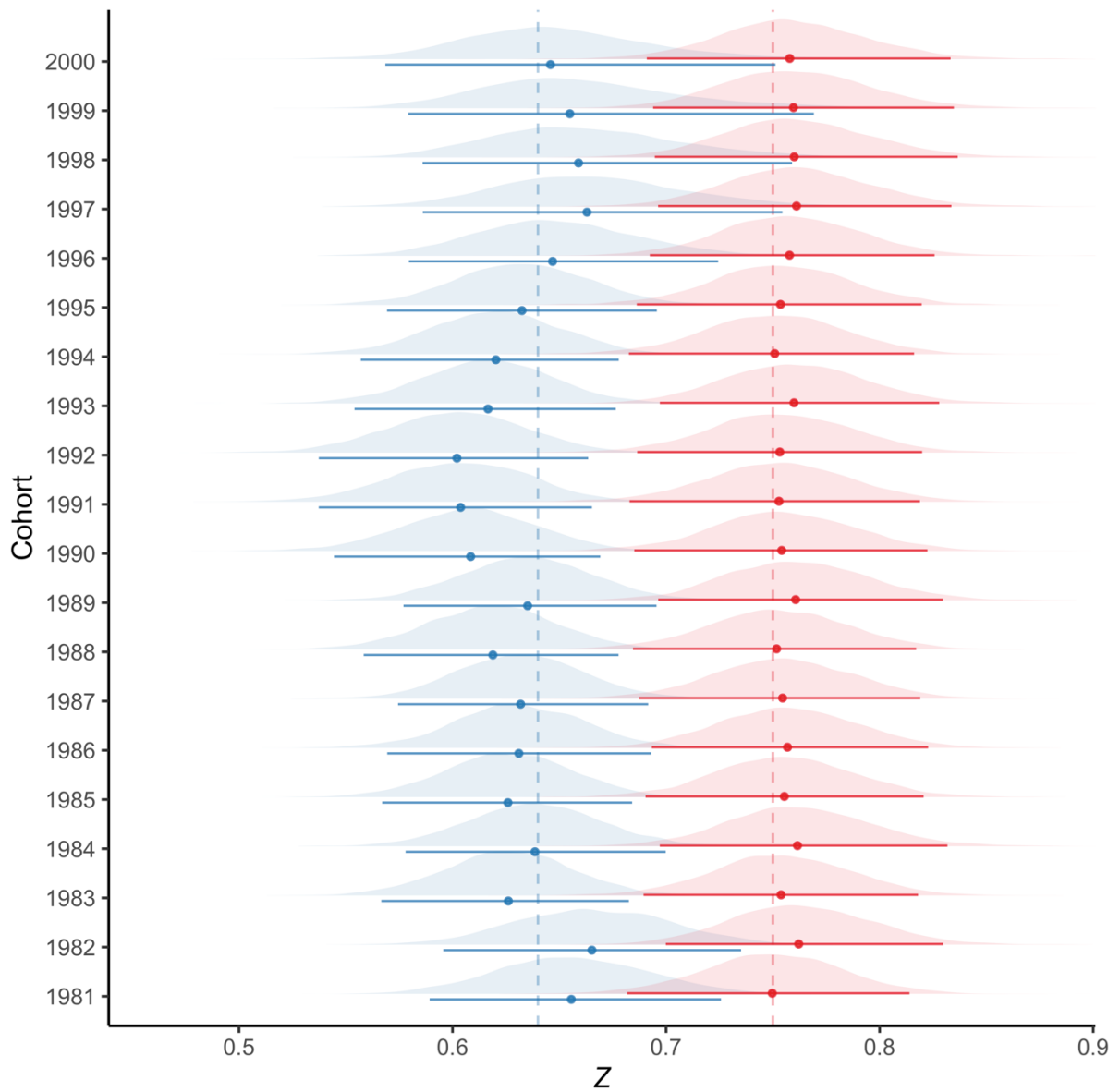
C



D



**Fig. S11.** The best catch curve model: (A) traceplot to illustrate chain convergence for key (population-level) parameters, (B) residuals, (C) QQ-plot and (D) posterior predictive check (D).



**Fig. S12.** Posterior distributions of the cohort-varying slopes in the best catch curve model, where  $Z$ , the mortality rate, is the negative of the slope of natural log of catch per unit effort (CPUE) as a function of age. Points correspond to the median and the vertical lines correspond to the 95% credible interval.