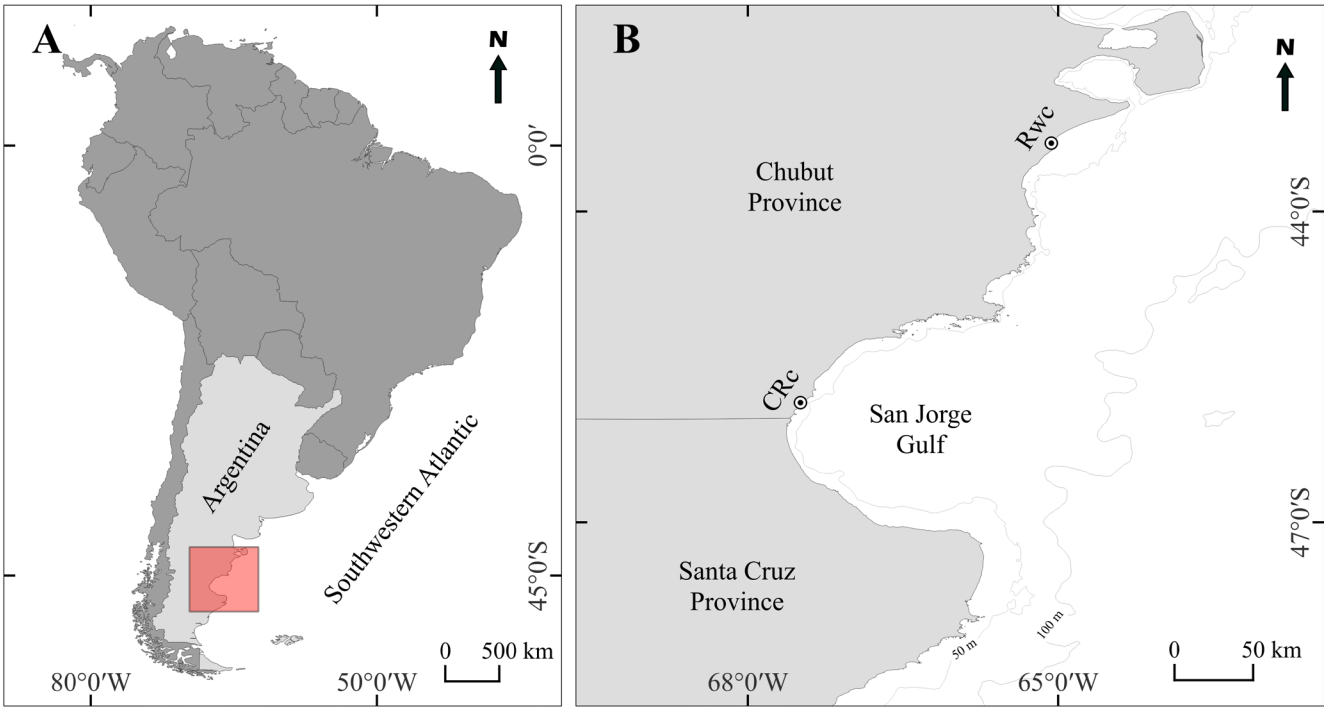

FIGURE S1 | Regional setting and location of the study area. Maps showing the geographic location of the study area (highlighted in red) in the Southwestern Atlantic (**A**) and a close-up of the San Jorge Gulf and the adjacent provinces of Chubut and Santa Cruz (**B**). Bathymetric isolines at 50 m and 100 m are included for environmental reference (panel B). CRc = Comodoro Rivadavia city; Rwc = Rawson city. Scale bars and north arrows are shown.

TABLE S2 | Rounds of model fitting to select the best random structure. Models were fitted using the glm and glmer functions of the lme4 package (Bates *et al*., 2015) in R (R Development Core Team, 2025).

Response variable	Fixed factors	Random factor	AIC
Presence	Depth * Latitude * Bottom salinity	–	131
Presence	Depth * Latitude * Bottom salinity	Year	133
Presence	Depth + Latitude + Bottom salinity + Depth:Latitude + Latitude:Bottom salinity + Depth:Bottom salinity	–	130
Presence	Depth + Latitude + Bottom salinity	–	126
Presence	Depth + Latitude	–	125

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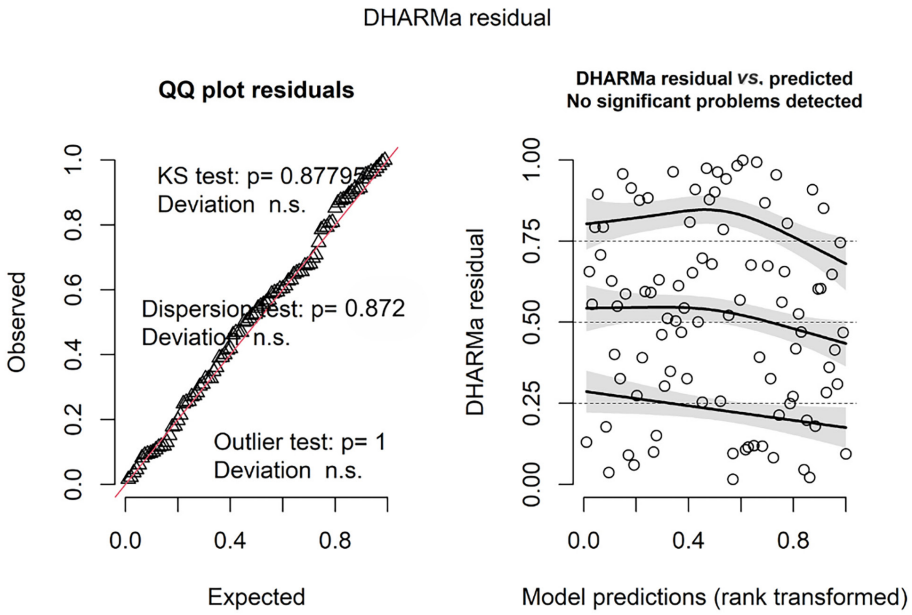

FIGURE S3 | Plots to evaluate goodness of fit and deviations from model assumptions by visually inspection of the model Presence~Depth+Latitude, using the DHARMa package (Hartig, 2022) in R (R Development Core Team, 2025).

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- **Hartig F.** DHARMa: residual diagnostics for hierarchical (multi-level/mixed) regression models. R package version 0.4.6. 2022. Available from: https://cran.r-project.org/web/packages/DHARMa/vignettes/DHARMa.html
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TABLE S4 | Rounds of model fitting to select the best random structure. Models were fitted using the glm and glmmTMB functions of the glmmTMB package (McGillycuddy *et al.*, 2025) in R (R Development Core Team, 2025).

Response variable	Fixed factors	Random factor	AIC
Density	Depth * Latitude * Bottom salinity * Bottom temperature	–	745
Density	Depth * Latitude * Bottom salinity * Bottom temperature	Year	747
Density	(Depth + Latitude + Bottom salinity + Bottom temperature)^2	–	746
Density	Depth + Latitude + Bottom salinity + Bottom temperature	–	747
Density	Latitude + Bottom salinity + Bottom temperature	–	745
Density	Latitude + Bottom salinity	–	745

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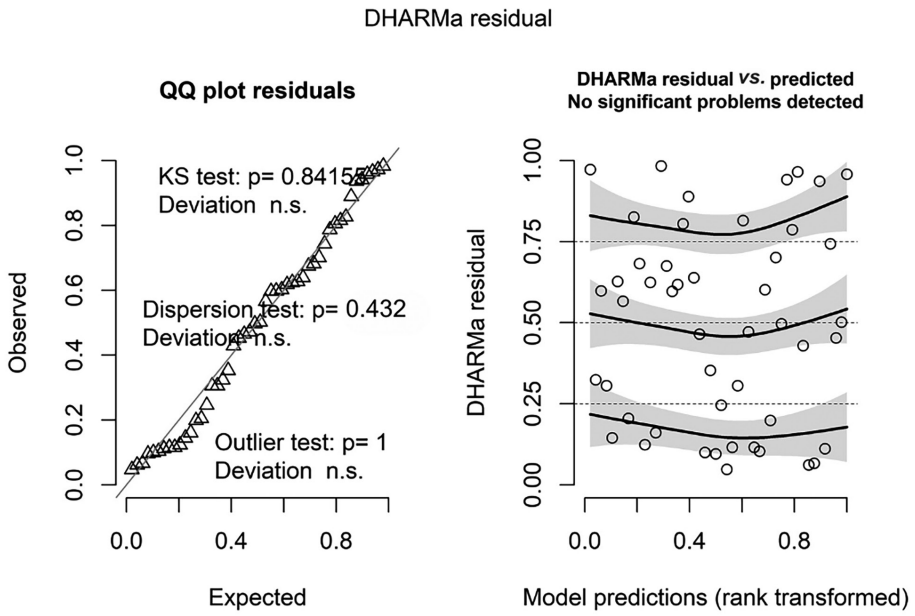

FIGURE S5 | Plots to evaluate goodness of fit and deviations from model assumptions by visually inspection of the model Density~Latitude+Bottom salinity, using the DHARMa package (Hartig, 2022) in R (R Development Core Team, 2025).

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- **Hartig F.** DHARMa: residual diagnostics for hierarchical (multi-level/mixed) regression models. R package version 0.4.6. 2022. Available from: https://cran.r-project.org/web/packages/DHARMa/vignettes/DHARMa.html
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