Links in the trophic chain: Modeling functional relationships between *in situ* oceanography, krill, and blue whale distribution under different oceanographic regimes

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SUPPLEMENTARY MATERIALS

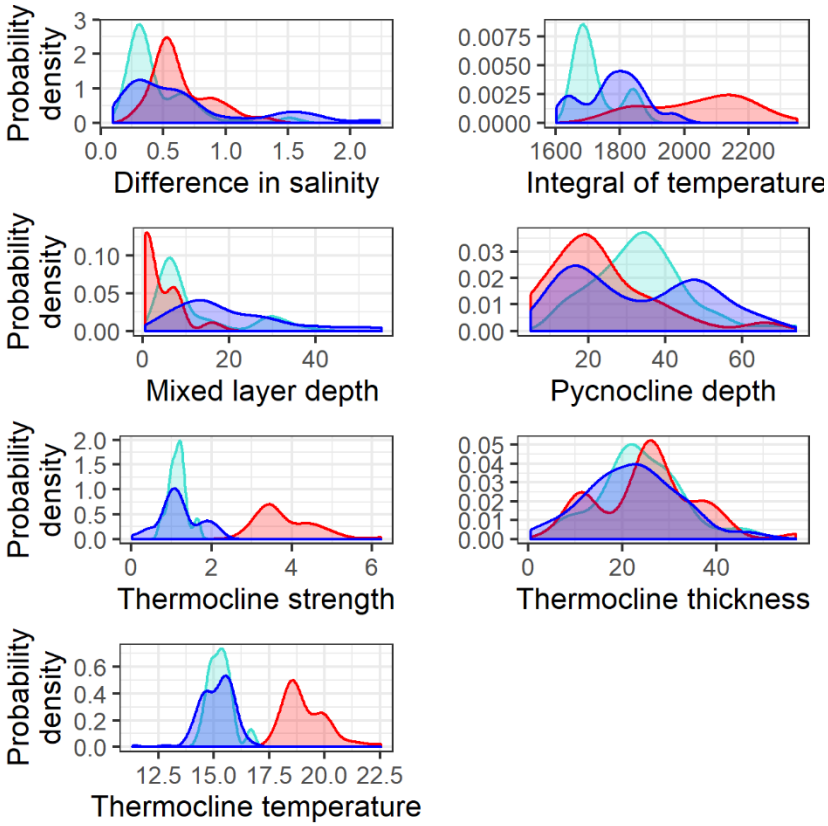

Figure S1. Probability density plots comparing the distribution of oceanographic metrics calculated from CTD profiles in the South Taranaki Bight region (STB) in the 2014 (turquoise), 2016 (red), and 2017 (blue) austral summer surveys, sampled at blue whale presence/background locations. Depth-related metrics are reported in meters. All definitions are in Table 2 of the manuscript. Note different y-axes ranges.

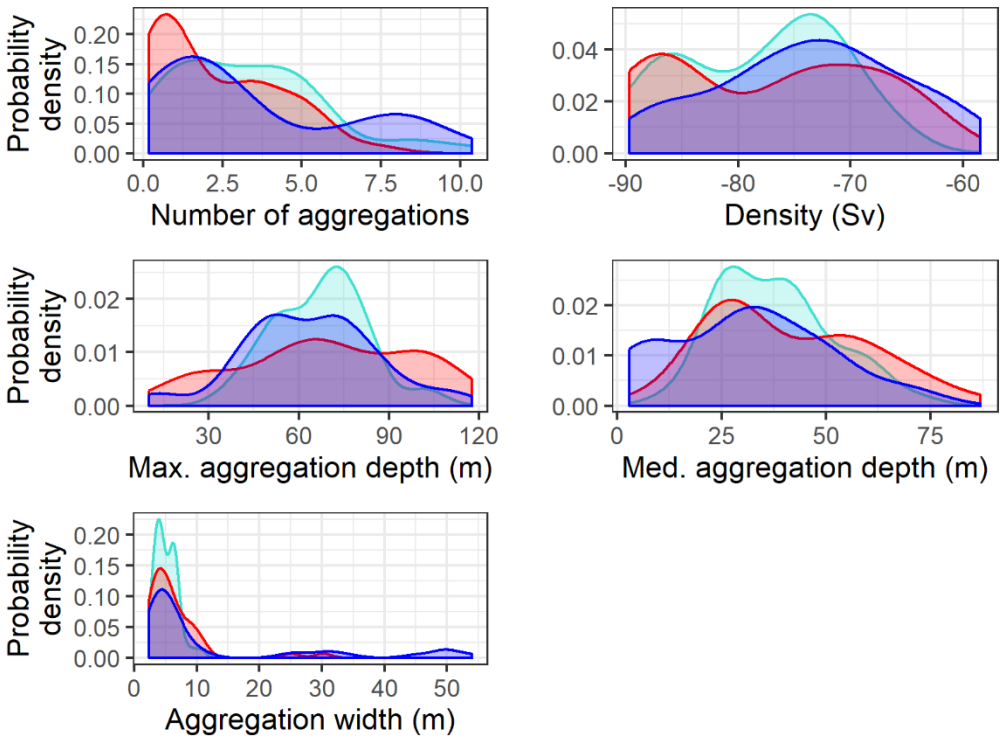

Figure S2. Probability density plots comparing the frequency distribution of krill metrics derived from echosounder data collected in the South Taranaki Bight region (STB) in the 2014 (turquoise), 2016 (red), and 2017 (blue) austral summer surveys, sampled at blue whale presence/background locations. Data have been subsampled so that sample sizes are equal between the three years for visualization (n = 42 points per year). Note different y-axis ranges.

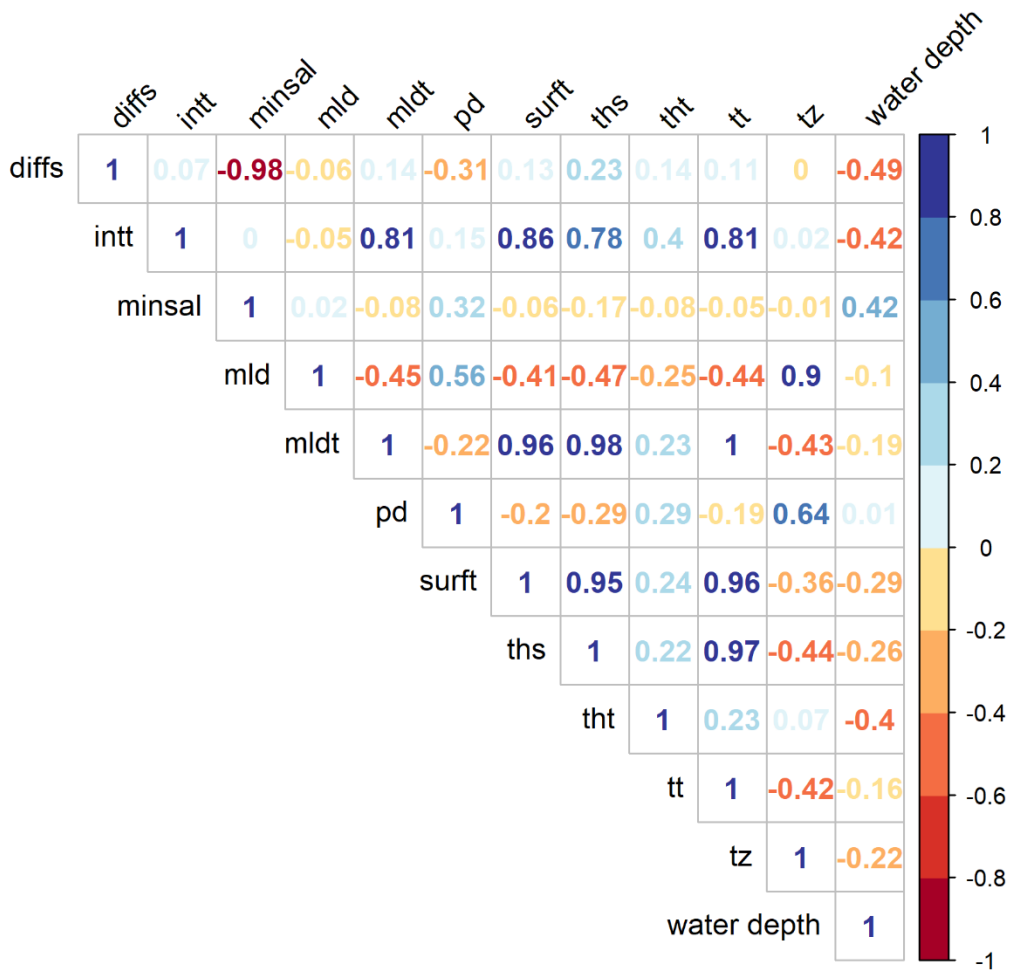

Figure S3. Correlation matrix of oceanographic variables derived from CTD casts (see Table 2 for acronym definition) and sampled at blue whale presence/background locations in all three survey years (n = 610) in the South Taranaki Bight region (STB). Pearson's correlation coefficient for each pairwise comparison is color-coded according to the strength of the correlation, with strong positive correlations in blue and strong negative correlations in red.

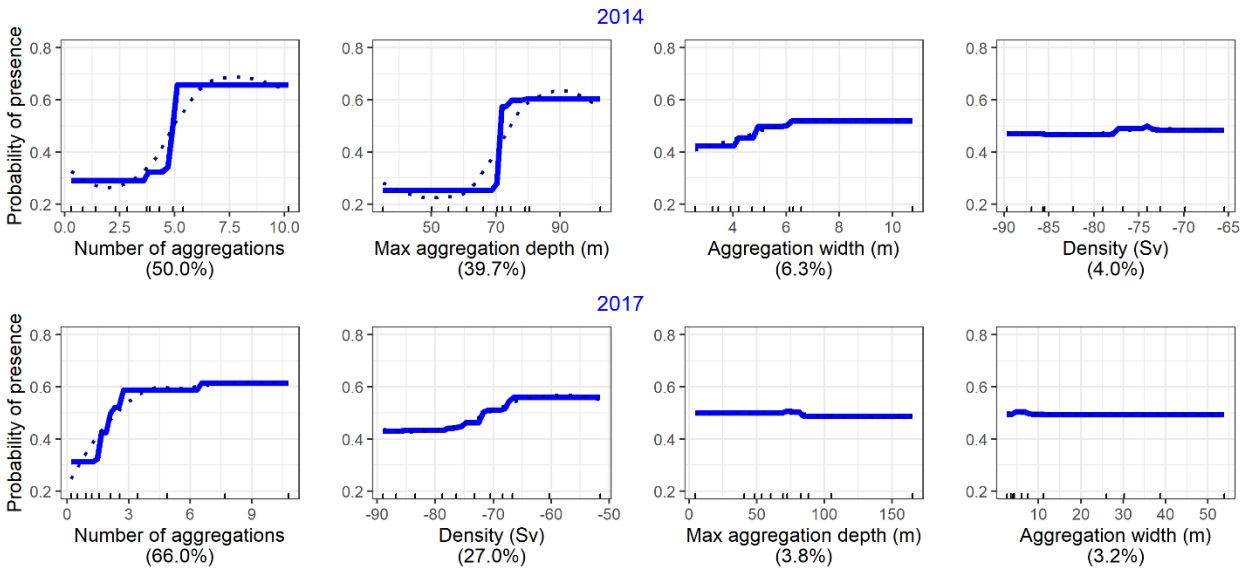

Figure S4. Boosted regression tree partial dependency plots for predictor variables of blue whale presence from the ***whales ~ krill*** models during the two typical oceanographic regime years, separately. Each plot shows the effect of a predictor variable on the probability of presence while fixing other variables to their mean value; the contribution to the model is given in parentheses. Dotted lines show the smoothed fitted function for each relationship. Rug plots show the distribution of values for each predictor in deciles.

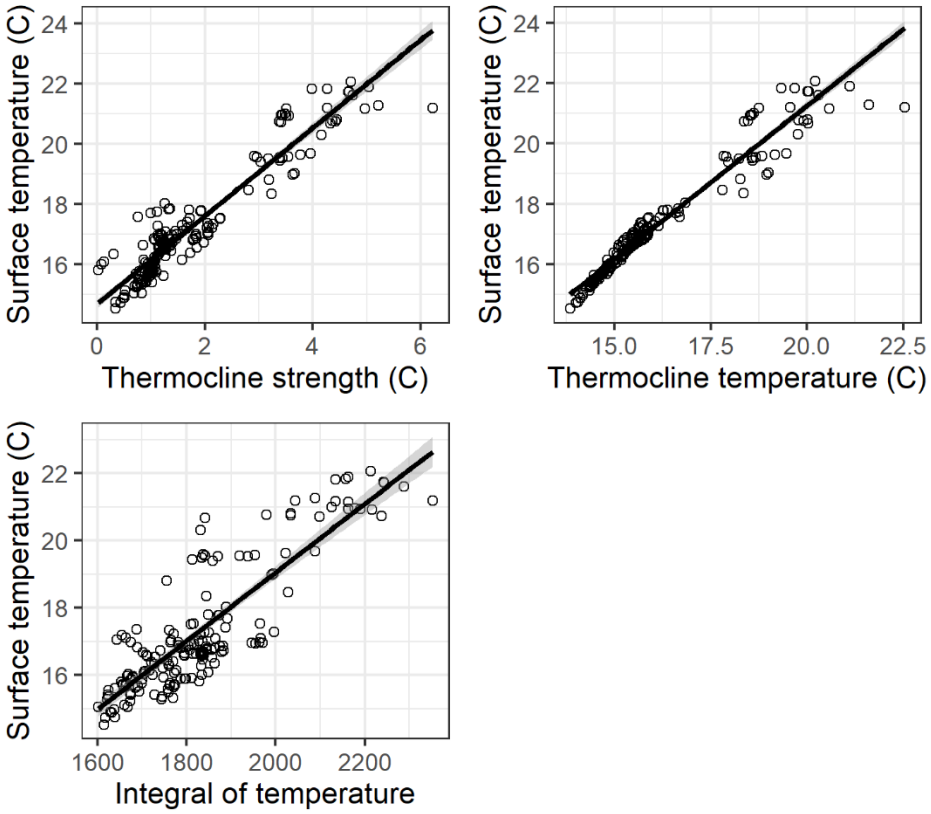

Figure S5. Relationships between surface temperature and three oceanographic metrics included in the ***krill ~ oceanography*** and ***whales ~ oceanography*** models. All oceanographic metrics were derived from CTD casts conducted in the South Taranaki Bight region in 2014, 2016, and 2017 and sampled at blue whale sightings and background points used for species distribution modeling (n = 648 locations).

Table S1. Results from a Moran's *I* test (p-value) to examine spatial autocorrelation among the standardized number of aggregations and mean aggregation density per 4-km grid cell, as visualized in Figure 4. Moran's *I* tests were run using the ape package in R (Paradis & Schliep 2019).

Year	Standardized number of aggregations	Mean aggregation density
2014	0.549	0.558
2016	0.773	**< 0.001***
2017	0.973	0.894

References:

Paradis E. & Schliep K. 2019. ape 5.0: an environment for modern phylogenetics and evolutionary analyses in R. Bioinformatics 35: 526-528.