Supplement

Table S1. Height-width ratio of gray whale calves (N=21), juveniles (N=5) and adults (N=9) for all measurement sites between 5 and 85% body length (BL) from the rostrum.

Measurement sites %BL from rostrum	Calves 4.12-6.62m	Juveniles 8.37-9.87m	Adults 11.22-12.38m	All whales 4.12- 12.38m
5	1.36	1.38	1.32	1.35
10	1.36	1.38	1.27	1.34
15	1.16	1.27	1.17	1.18
20	1.02	1.07	1.07	1.04
25	0.92	0.92	0.96	0.93
30	0.91	0.91	0.93	0.91
35	0.96	0.93	0.92	0.95
40	1.02	0.96	0.94	0.99
45	1.06	1.01	0.98	1.04
50	1.13	1.11	1.08	1.11
55	1.20	1.20	1.20	1.20
60	1.29	1.26	1.33	1.29
65	1.37	1.34	1.47	1.39
70	1.44	1.38	1.53	1.45
75	1.53	1.42	1.54	1.51
80	1.70	1.65	1.70	1.69
85	1.83	1.83	1.88	1.85

Figure S1. Mean absolute body width of gray whale calves (top-left), juveniles (top-right), adults (bottom-left) and lactating females (bottom-right) at different measurement sites for each year (see colour legend). BL=Body length. For sample sizes, see Table 1 in the main manuscript.

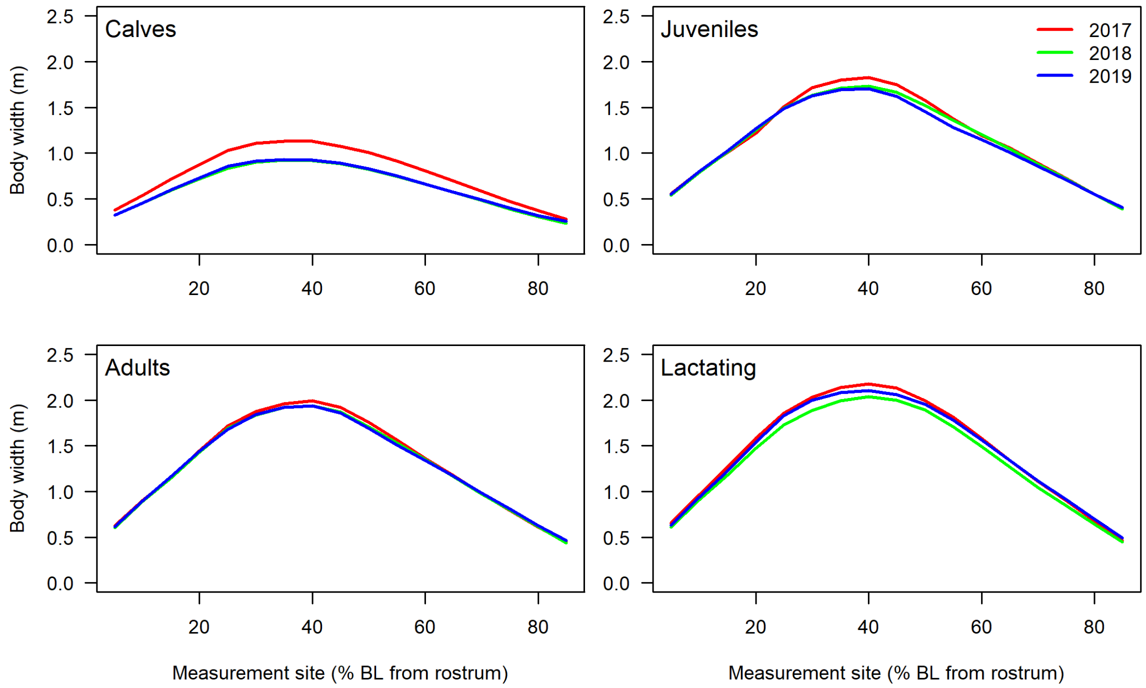


Figure S2. Mean relative body width (body width/body length) of gray whale calves (top-left), juveniles (top-right), adults (bottom-left) and lactating females (bottom-right) at different measurement sites for each year (see colour legend). BL=Body length. For sample sizes, see Table 1 in the main manuscript.

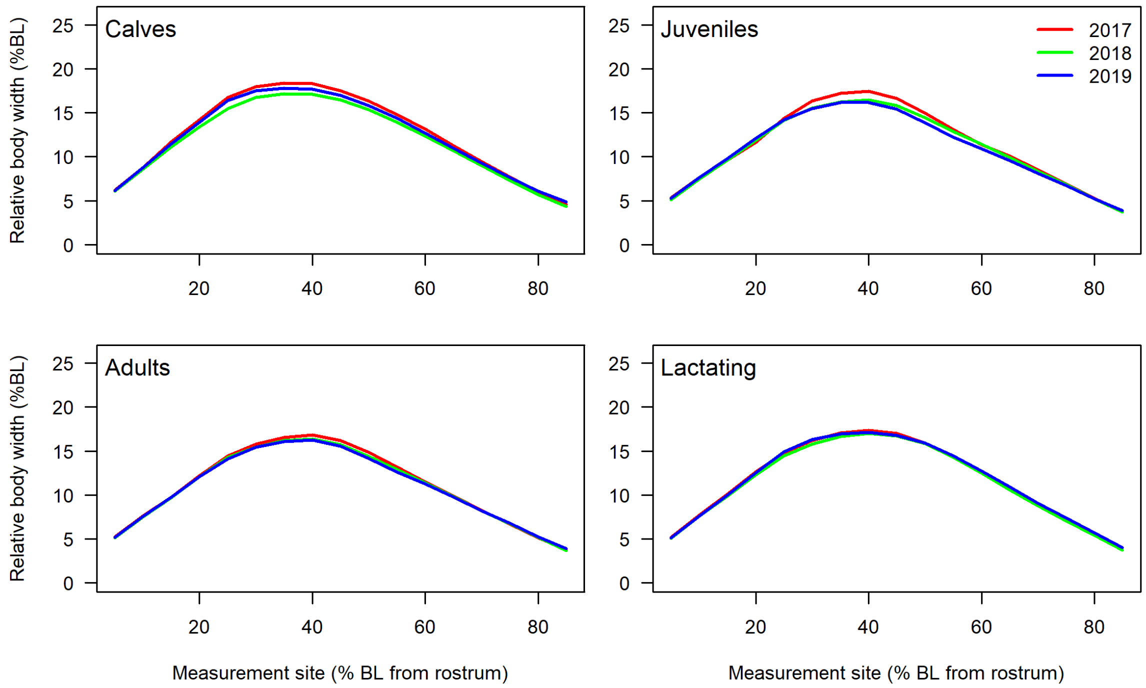


Figure S3. Scatter plots of gray whale body condition as a function of (A) year, (B) reproductive class (calf, juvenile, adult, lactating), and day of year separated into (C) calves, (D) juveniles, (E) adults and (F) lactating females. For sample sizes, see Table 1 in the main manuscript.

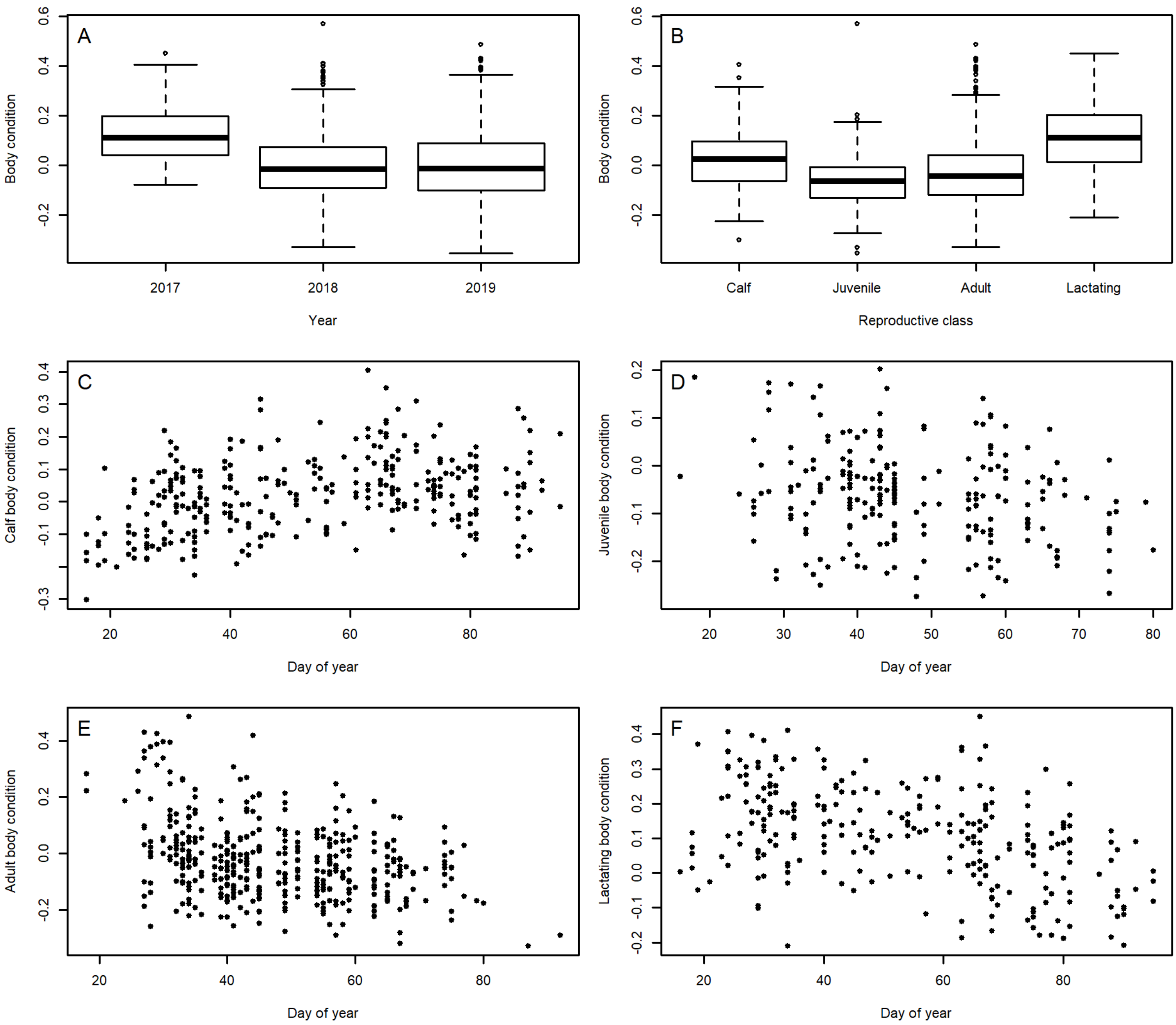
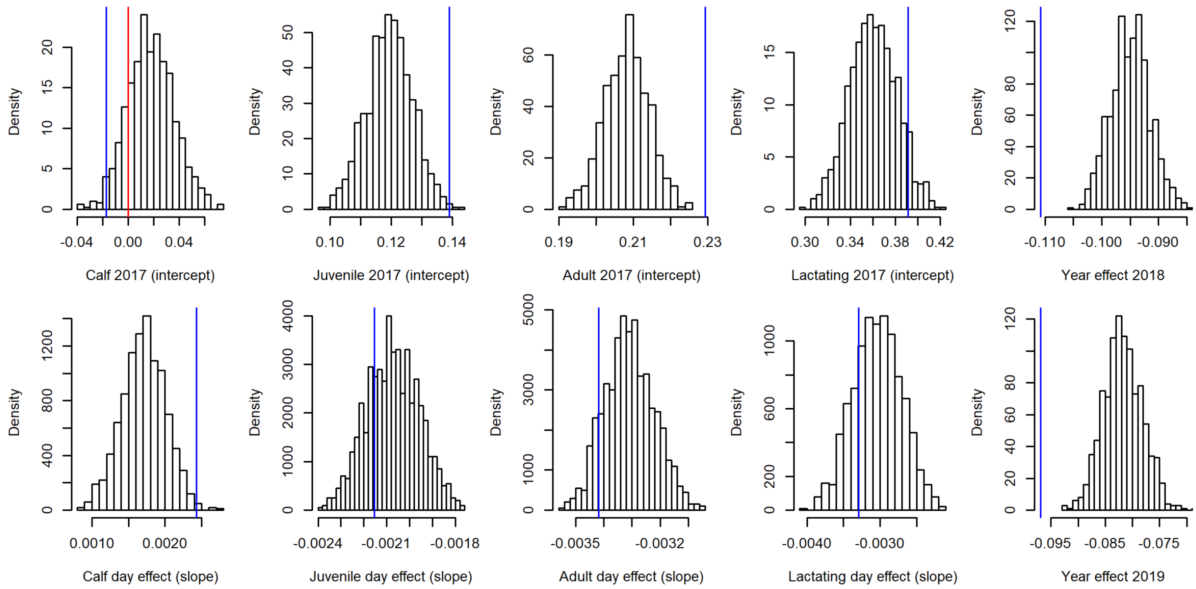


Figure S4. Density distribution of model parameters from a linear model (LM) for gray whale body condition (BC), as a function of reproductive class (Rep), year and day of year (LM: BC~Rep+Year+Rep×Day), resulting from single measure (one measurement from each individual whale) bootstrap simulation (1,000 iterations). For each iteration, a single body condition measurement was randomly drawn from each individual whale, and a LM was fitted with the same fixed effect (but without a random effect) as the best fitting LMM in the original analysis (Model 9 in Table 2 in the main manuscript). The blue vertical lines indicate the parameter value of the original LMM for comparison. The vertical red lines denote zero (no effect).



Text S1. Equations used to estimate body volume (BV) of gray whales from body length (BL) and various girth (G) measurements, including: G1 (girth at eyes = 17%BL from rostrum), G2 (girth at axilla = 30%BL from rostrum), G3 (maximum girth = 40%BL from rostrum), G4 (girth at anus = 72%BL from rostrum) and G5 (girth midway between the anus and the fluke notch = 86%BL from rostrum). Each model was estimated from a sample of 1,245 whales. The variance explained (R^2) by each model is also provided.

Model 1 (R^2 = 0.9991; input variables: BL, G1, G2, G3, G4, G5):

$$\log(BV) = -2.757 + 0.884 \times \log(BL) + 0.336 \times \log(G1) + 0.364 \times \log(G2) + 0.904 \times \log(G3) + 0.508 \times \log(G4) + 0.005 \times \log(G5)$$

Model 2 (R^2 = 0.9991; input variables: BL, G1, G2, G3, G4):

$$\log(BV) = -2.760 + 0.885 \times \log(BL) + 0.337 \times \log(G1) + 0.364 \times \log(G2) + 0.902 \times \log(G3) + 0.512 \times \log(G4)$$

Model 3 (R^2 = 0.9988; input variables: BL, G2, G3, G4, G5):

$$\log(BV) = -2.860 + 0.973 \times \log(BL) + 0.568 \times \log(G2) + 0.912 \times \log(G3) + 0.508 \times \log(G4) + 0.013 \times \log(G5)$$

Model 4 (R^2 = 0.9975; input variables: BL, G1, G2, G3):

$$\log(BV) = -3.002 + 0.900 \times \log(BL) + 0.358 \times \log(G1) + 0.437 \times \log(G2) + 1.293 \times \log(G3)$$

Model 5 (R^2 = 0.9988; input variables: BL, G2, G3, G4):

$$\log(BV) = -2.869 + 0.976 \times \log(BL) + 0.570 \times \log(G2) + 0.908 \times \log(G3) + 0.517 \times \log(G4)$$

Model 6 (R^2 = 0.9961; input variables: BL, G1, G4, G5):

$$\log(BV) = -2.705 + 1.246 \times \log(BL) + 0.907 \times \log(G1) + 0.913 \times \log(G4) - 0.041 \times \log(G5)$$

Model 7 (R^2 = 0.9966; input variables: BL, G3):

$\log(BV) = -3.166 + 1.075 \times \log(BL) + 1.843 \times \log(G3)$

Model 8 (R^2 = 0.9949; input variables: BL, G2):

$\log(BV) = -3.256 + 1.247 \times \log(BL) + 1.751 \times \log(G2)$