

Supplementary Material

Comparatively poorer body condition of south-east Indian Ocean pygmy blue whales on their southern migration

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The following supplement accompanies the article:

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Supplement 1.

Figure S1. Example of lateral measurements of a pygmy blue whale

Figure S2. Boxplot of measurement error of an object of known length

Figure S3. Sensitivity analysis for adults and juveniles (BC ~ Migration direction)

Figure S4. Log-log relationship between body volume and body length

Figure S5. Morphometric comparisons of South-east Indian Ocean pygmy blue whales

Table S1. Temporal data of sightings

Table S2. The range, mean (\bar{x}) and standard deviation (SD) of head length, length to blowhole, width of eyes and fluke width.

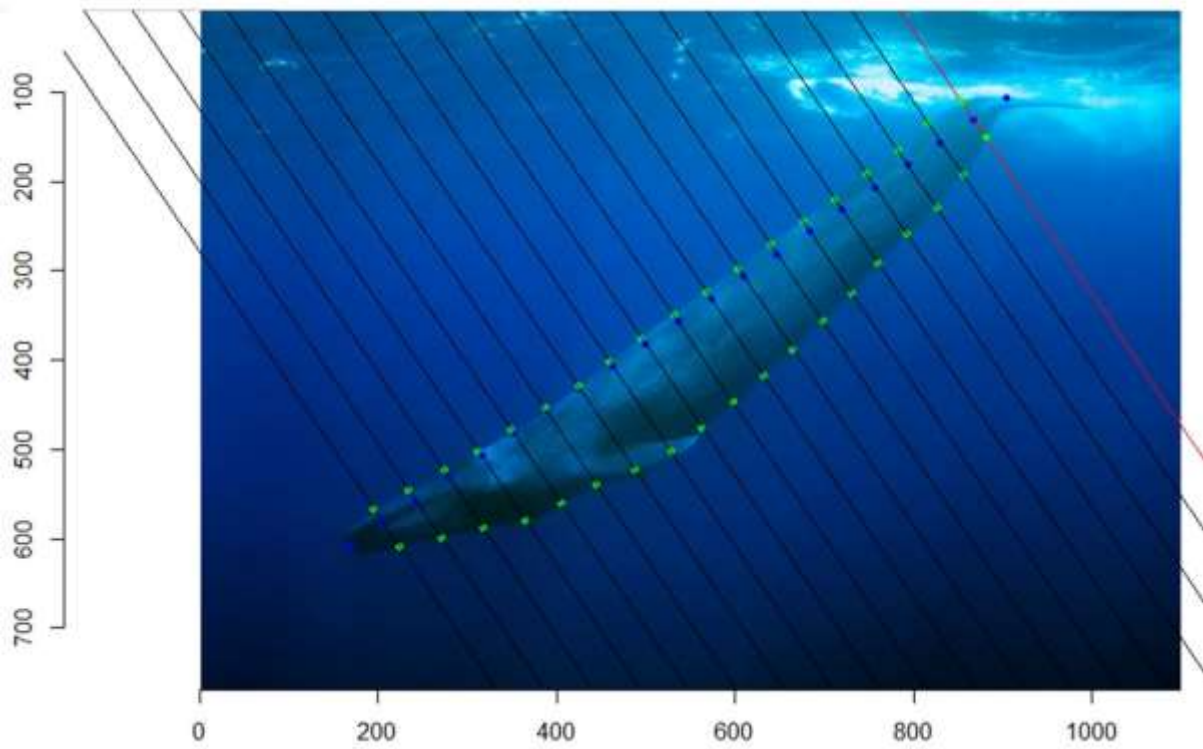


Figure S1. Example of lateral measurements in pixels (x and y axis) obtained for pygmy blue whales using R v4.0.4 (R Core Team 2021). X and Y axis are in pixels.

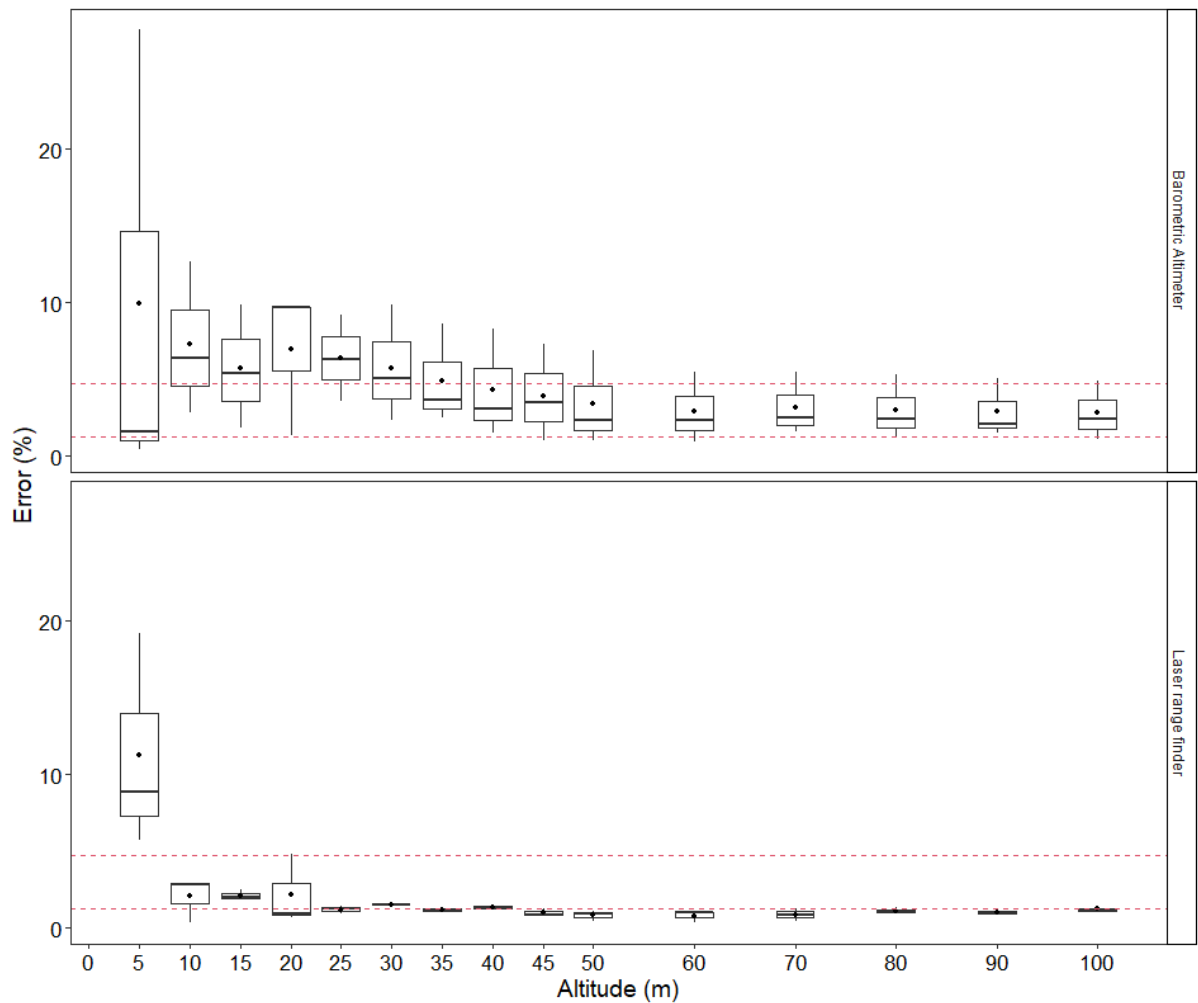


Figure S2. Boxplot showing the measurement error (%) from a laser range finder and the UAV (Phantom 4 Pro) barometric altimeter for a 5 m object from three unmanned aerial vehicle flights flown at altitudes from 5 to 100 m. For altitudes between 5 to 50 m the UAV stopped at 5 m intervals, whilst between 50 to 100 m the UAV stopped at 10 m intervals. Black points represent the mean error for each altitude with dashed red lines representing the average error for the laser range finder (bottom line, 1.25%) and the barometric altimeter (top line, 4.71%) for altitudes used in this study (between 30 to 45 m) to measure whales.

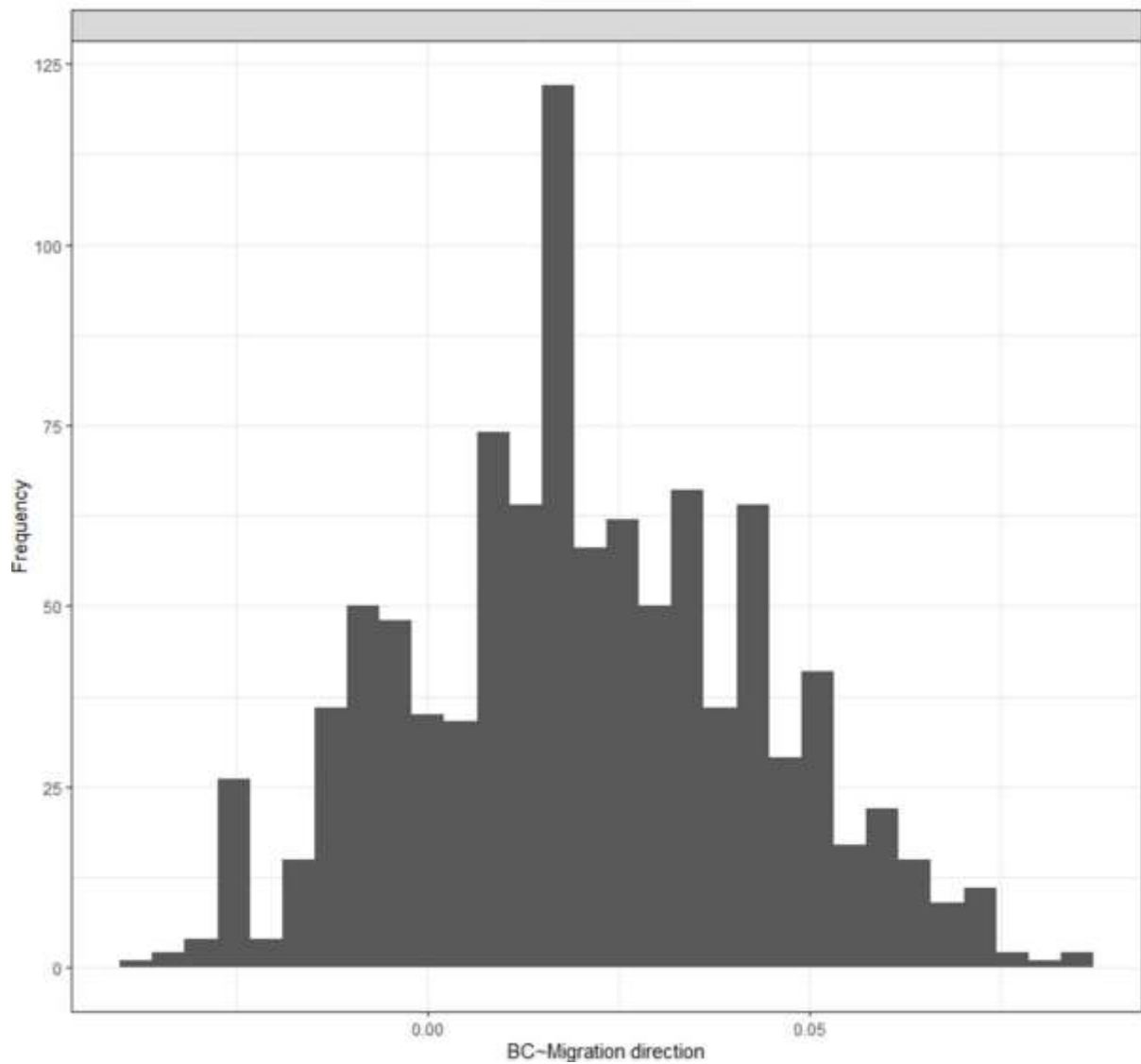


Figure S3. Histogram showing the density distribution of the model (change in body condition with migration direction, north vs south, for adult pygmy blue whales) parameter (slope) from the sensitivity analysis of measurement errors calculated for the barometric altimeter and laser range finder.

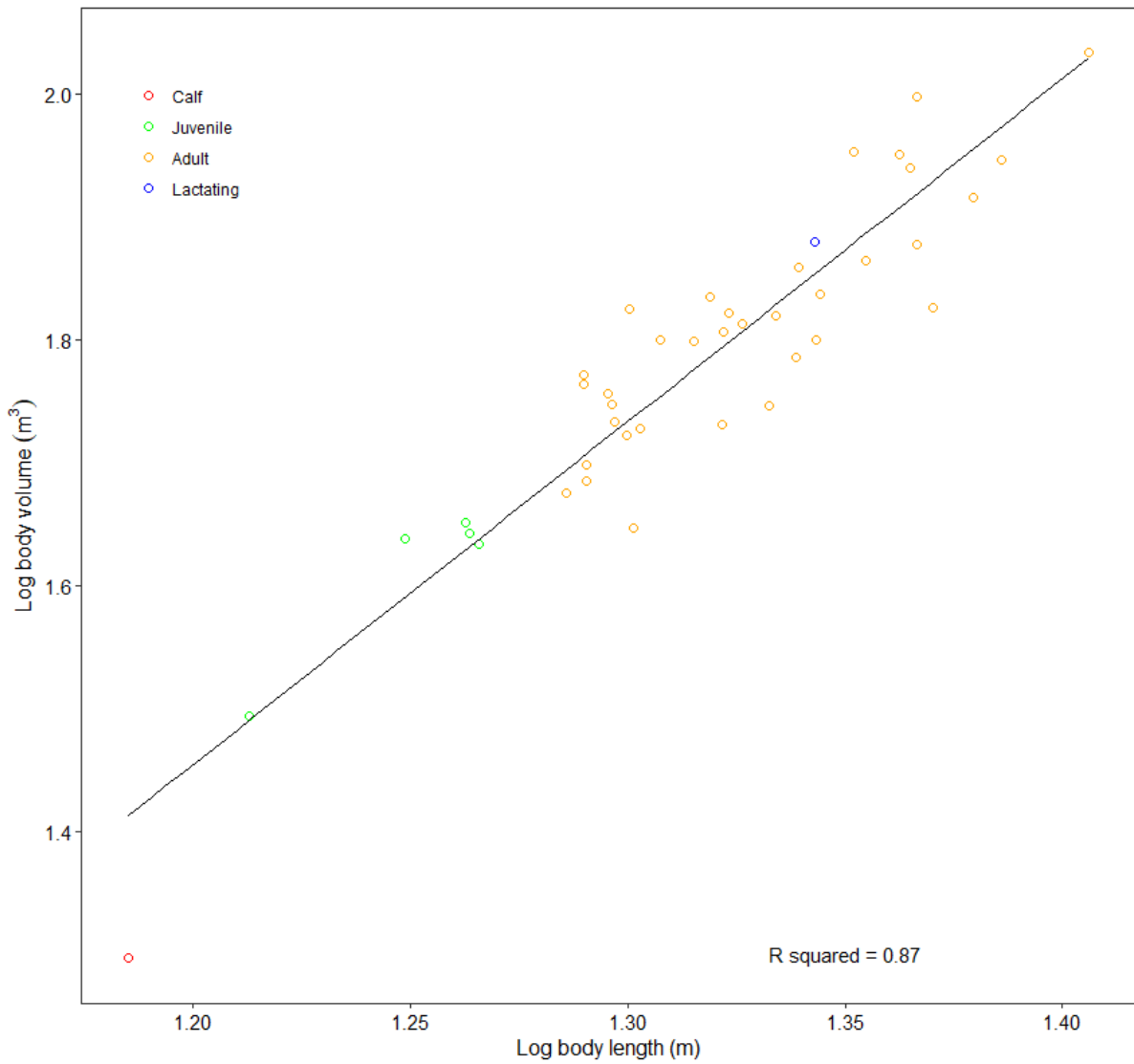


Figure S4. The log relationship between body volume and body length for each reproductive class of Southeast Indian Ocean pygmy blue whales sampled in 2021 and 2022 in Western Australia, $n = 1$ calf, 5 juveniles, 36 adults, and 1 lactating female.

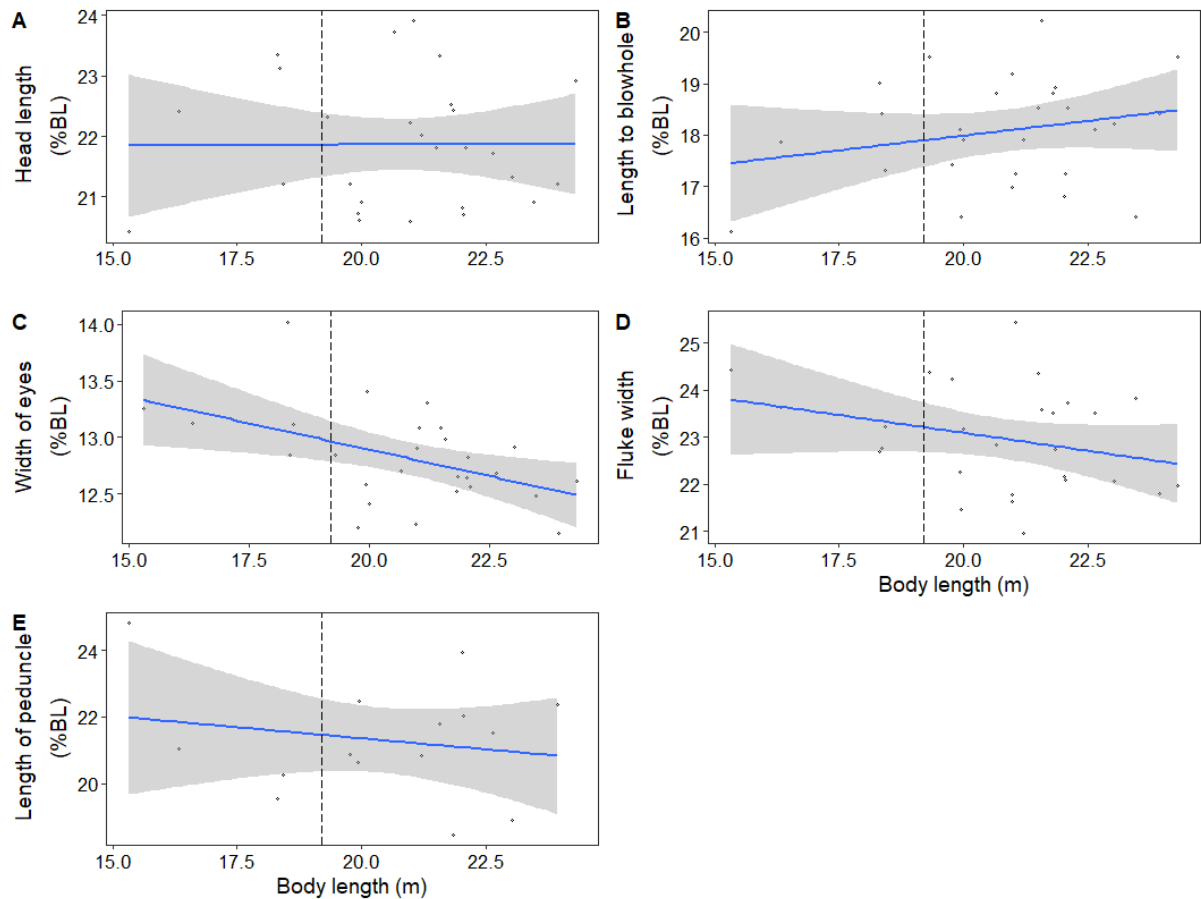


Figure S5. Morphometric comparisons using linear models for A) head length, B) length to blowhole, C) width of eyes, D) fluke width and E) length of peduncle (as a percentage of body length) for South-east Indian Ocean pygmy blue whales sampled in the Perth Canyon and Geographe Bay, Western Australia in 2021 and 2022 ($n = 27$, $n = 15$ for E only due to ability to distinguish dorsal fin). Points represent individuals sampled with photographs of adequate quality to use for photogrammetry and using a laser range finder to estimate absolute body sizes. Solid lines fitted using loess method with shaded grey the 95% confidence interval. Dashed lines represent length at sexual maturity (19.2 m) for pygmy blue whales and used as a cut off between juvenile and adult whales in this study.

Table S1.

Month	Animal ID	Reproductive class	Location
April	A1	Adult	Perth Canyon
April	A2	Adult	Perth Canyon
April	A3	Juvenile	Perth Canyon
April	A4	Adult	Perth Canyon
April	A5	Adult	Perth Canyon
April	A6	Adult	Perth Canyon
April	A7	Adult	Perth Canyon
April	A12	Juvenile	Perth Canyon
April	A13	Juvenile	Perth Canyon
May	A8	Adult	Perth Canyon
May	A9	Adult	Perth Canyon
May	A10	Adult	Perth Canyon
May	A11	Adult	Perth Canyon
May	A14	Adult	Perth Canyon
May	A15	Juvenile	Perth Canyon
May	A16	Adult	Perth Canyon
May	A17	Adult	Perth Canyon
May	A18	Adult	Perth Canyon
May	A19	Adult	Perth Canyon
May	A20	Adult	Perth Canyon
October	A21	Adult	Geographe Bay
October	A22	Adult	Geographe Bay
October	A23	Adult	Geographe Bay
October	A24	Adult	Geographe Bay
October	A25	Adult	Geographe Bay
October	A26	Adult	Geographe Bay
October	A27	Adult	Geographe Bay
October	A29	Adult	Geographe Bay
October	A30	Adult	Geographe Bay
October	A31	Adult	Geographe Bay

October	A32	Adult	Geographe Bay
October	A33	Adult	Geographe Bay
October	A34	Adult	Geographe Bay
October	A35	Adult	Geographe Bay
October	A36	Adult	Geographe Bay
November	CC1	Lactating female	Geographe Bay
November	CALF1	Calf	Geographe Bay
November	A37	Adult	Geographe Bay
November	A39	Adult	Geographe Bay
November	A40	Adult	Geographe Bay
November	A41	Adult	Geographe Bay
November	A42	Adult	Geographe Bay

Table S2. The range, mean (\bar{x}) and standard deviation (SD) of head length, length to blowhole, width of eyes and fluke width as a percent of body length for different reproductive classes of South-east Indian Ocean pygmy blue whales sampled in the Perth Canyon and Geographe Bay, Western Australia during the 2021 and 2022 migrations.

	Calf <i>(n = 1)</i>	Juvenile <i>(n = 4)</i>	Adult <i>(n = 21)</i>	Lactating <i>(n = 1)</i>
Head length (%)	20.42	21.22 – 23.35	20.59 – 23.91	20.82
<i>($\bar{x} \pm \text{SD}$)</i>		(22.53 \pm 0.96)	(21.86 \pm 1.02)	
Length to blowhole (%)	16.12	17.32 – 19.01	16.42 – 20.22	16.82
<i>($\bar{x} \pm \text{SD}$)</i>		(18.16 \pm 0.73)	(18.21 \pm 1.01)	
Width of eyes (%)	13.25	12.84 – 14.02	12.15 – 13.41	12.65
<i>($\bar{x} \pm \text{SD}$)</i>		(13.28 \pm 0.51)	(12.72 \pm 0.34)	
Fluke width (%)	24.44	22.68 – 23.64	20.96 – 25.44	22.16
<i>($\bar{x} \pm \text{SD}$)</i>		(23.08 \pm 0.44)	(22.92 \pm 1.18)	

Peduncle length (%)	24.80	19.54 – 21.04	18.74 – 22.47	23.93
($\bar{x} \pm \text{SD}$)		(20.28 \pm 0.75)	(20.99 \pm 1.37)	
