

Inter-annual variation in environmental factors affect the prey and body condition of beluga whales in the eastern Beaufort Sea

Emily S. Choy*, Bruno Rosenberg, James D. Roth, Lisa L. Loseto

*Corresponding author: choye@myumanitoba.ca

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Table S1. Linear models for biological variables on body condition morphometrics and stable isotope ratios in beluga whales ($n=159$) and their corresponding AIC_c values. $\Delta_i AIC_c$ is the difference between AIC_c for the current model and the minimum of AIC_c among all the models.

Morphometric	Model	AIC_c	Akaïke weights (w_i)	$\Delta_i AIC_c$
Log(Girth)	Sex \times Age + log(Length)	-321.03	0	0.61
	Sex \times Age + Sex \times log(Length)	-319.02	2.01	0.22
	Sex \times Age + Sex \times log(Length) + log(Length) \times Age	-317.20	3.83	0.09
	Sex \times Age \times log(Length)	-316.02	5.01	0.05
	Sex + Age + log(Length)	-315.26	5.77	0.03
Blubber	Length + Age	721.59	0	0.53
	Sex + Age + Length	723.14	1.55	0.24
	Sex \times Length + Age	724.49	2.9	0.12
	Sex \times Age + Age \times Length	726.46	4.87	0.05
	Sex \times Age \times Length	726.70	5.11	0.04
	Sex \times Age + Sex \times Length + Length \times Age	728.57	6.98	0.02
$\delta^{15}N$	Length + Age	278.81	0	0.38
	Length \times Age	280.93	2.12	0.13
	Length \times Age + Sex	281.45	2.64	0.10
	Length \times Age \times Sex	285.27	6.46	0.01
	Length	289.43	10.62	0.00
Log($\delta^{13}C+40$)	Age + Year	-721.78	0	0.82
	Age \times Year	-718.16	3.62	0.13
	Age \times Year + Sex	-715.27	6.51	0.03
	Age \times Year + Sex \times Age	-713.07	8.71	0.01
	Age	-705.10	16.68	0.00

Table S2. PERMANOVA pairwise results for the year \times sex-and-size class interaction on fatty acid composition of beluga whales (n = 175). p-values were obtained using 9999 permutations. * indicates p-values obtained from Monte-Carlo samplings when the number of unique permutations was <100.

Factor	Level	Comparison	t	p
Year	2011	Large vs. medium males	1.24	0.20
		Large vs. small males	1.66	0.03
		Medium vs. small males	1.03	0.38
	2012	Large vs. medium males	1.25	0.20
		Large vs. small males	0.24	1.00
		Medium vs. small males	0.85	0.55
		Large males vs. females	1.00	0.39
		Medium males vs. females	2.00	<0.01
	2013	Small males vs. females	0.68	0.68
		Large vs. medium males	1.82	0.03
		Large vs. small males	3.61	<0.01
		Medium vs. small males	2.74	0.01
		Large males vs. females	2.25	<0.01
	2014	Medium males vs. females	1.13	0.25
		Small males vs. females	2.24	0.04
		Large vs. medium males	1.27	0.18
Large vs. small males		2.22	0.02	
Medium vs. small males		3.82	<0.01	
Large males vs. females		2.67	<0.01	
Medium males vs. females		3.58	<0.01	
Sex and size class	Large males	Small males vs. females	0.67	0.60
		2011 vs. 2012	1.12	0.29
		2011 vs. 2013	0.98	0.40
		2011 vs. 2014	1.08	0.30
		2012 vs. 2013	1.97	<0.01
		2012 vs. 2014	1.38	0.12
	Medium males	2013 vs. 2014	1.58	0.08
		2011 vs. 2012	0.92	0.45
		2011 vs. 2013	1.50	0.08
		2011 vs. 2014	1.25	0.19
		2012 vs. 2013	2.18	<0.01
	Small males	2012 vs. 2014	1.36	0.13
		2013 vs. 2014	1.31	0.16
		2011 vs. 2012	1.07	0.35*
		2011 vs. 2013	1.48	0.17*
		2011 vs. 2014	2.62	0.01
	Females	2012 vs. 2013	1.54	0.17*
		2012 vs. 2014	2.66	0.02*
		2013 vs. 2014	0.58	0.58
		2012 vs. 2013	0.96	0.41
		2012 vs. 2014	2.79	<0.01
		2013 vs. 2014	2.76	<0.01

Table S3. Percentages (%) of fatty acids contributing to the overall dissimilarities in fatty acid signatures among beluga whales between sex and size classes and years produced by a two-factor similarity percentages routine analysis (SIMPER). Small, medium, and large size-classes refer to males only.

Comparison	16:1n-7	22:1n-11	20:1n-9	18:1n-9	16:0	22:6n-3	20:1n-11	Total
Large vs. small	35.0	26.2	15.2	6.9				83.3
Large vs. medium	24.8	25.1	14.5	6.0	6.2	5.3		81.9
Large vs. female	21.2	39.9	13.6	5.6				80.3
Female vs. medium	26.2	21.4	13.6		6.0	6.3	9.1	82.6
Female vs. small	39.5	17.0	15.9	5.3		6.9		84.6
Medium vs. small	39.9	21.2	13.6	5.6				80.3
2011 vs. 2012	19.3	17.3	12.3	11.1		10.2	14.6	84.8
2011 vs. 2013	25.5	18.5	13.4	12.8		8.3	8.4	86.9
2011 vs. 2014	22.6	22.1	12.1	14.7		7.2	7.2	85.9
2012 vs. 2013	27.3	18.1	13.6	9.6			11.4	80.0
2012 vs. 2014	26.7	19.3	12.9	10.9		6.2	9.3	85.3
2013 vs. 2014	28.4	26.1	14.8	9.3	3.9			82.5

Table S4. Results of the distance-based linear models (DISTLM) marginal tests, quantifying the relative contribution (proportion of variance) and significance levels of variables explaining fatty acid patterns in the blubber of EBS beluga whales (n=175). SS_{trace} is the portion of the sum of squares that is related to the predictor variable.

Variable	SS_{trace}	Pseudo- F	p	Variance (%)	df
Age	13.43	17.88	<0.01	9.37	2,173
Year	11.35	4.90	<0.01	7.92	4,171
Maximum Girth	11.04	14.43	<0.01	7.70	2,173
Length	8.19	10.49	<0.01	5.72	2,173
Sex	6.63	8.39	<0.01	4.62	2,173
Blubber Thickness	0.52	0.62	0.62	0.36	2,173

Table S5. PERMANOVA pairwise results for year and sex and size class on stable isotope ratios of beluga whales (n = 169). p-values were obtained using 9999 permutations.

Factor	Comparison	t	p
Year	2011 vs. 2012	0.67	0.64
	2011 vs. 2013	2.72	<0.01
	2011 vs. 2014	1.29	0.19
	2012 vs. 2013	2.02	0.02
	2012 vs. 2014	0.74	0.55
	2013 vs. 2014	2.53	<0.01
	Sex and size class	Large vs. medium males	1.45
Large vs. small males		2.31	0.01
Medium vs. small males		2.01	0.02
Large males vs. females		2.37	0.01
Medium males vs. females		2.36	0.01
Small males vs. females		1.60	0.09