

**Blue Whale (*Balaenoptera musculus*) Mother–Calf Pair
Behavioral Response to Vessel in the Southern California Bight
Supplementary Material**

Mari A. Smultea,¹ Frances C. Robertson,² and Dagmar Fertl^{1,3}

¹*Smultea Environmental Sciences, PO Box 256, Preston, WA 98050, USA*

E-mail: mari@smulteasciences.com

²*San Juan County Marine Program, PO Box 729, Friday Harbor, WA 98250, USA*

³*Ziphius EcoServices, 30403 N. Holly Oaks Circle, Magnolia, TX 77355, USA*

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Using scan and focal individual sampling protocols (Altmann, 1974; Mann, 1999), we quantified four parameters before, during, and after vessel presence while a blue whale (*Balaenoptera musculus*) mother–calf (MC) pair was within view from our circling small, fixed-wing aircraft (at or up to ~3 to 5 m below the water surface): (1) percentage of time in view as an index of horizontal or vertical (i.e., diving) behavioral response; (2) estimated inter-individual distance between MC pair at 30-s intervals; (3) position of calf relative to four quarters around the mother noted at 30-s intervals; and (4) mean blow interval (BI; time between successive blows within a single surfacing event) (Taber & Thomas, 1982; Thomas & Taber, 1984; Würsig et al., 1984, 1989; Richardson et al., 1985, 1995). The effect of the vessel on MC separation distance and BI was investigated with a Wilcoxon or Mann-Whitney U test. A Fisher’s exact test was used to determine whether the presence of the vessel influenced on which side of the mother the calf was recorded.

With the vessel present, although both the maximum and mean spacing between mother and calf (i.e., separation distance) increased slightly, this difference was not significant based on the small sample size (Table S1; Wilcoxon test = 704, $p = 0.459$). The overall mean BI for the mother was 1.4 min compared to 0.4 min for the calf (Table S2). Vessel presence had no detectable effect on the mother’s BI (Wilcoxon test = 8, $p = 0.381$) but led to a nominally significant increase in calf BI (Wilcoxon test = 6, $p = 0.002$). The presence of the vessel was not found to affect the position of the calf relative to the mother ($p = 0.079$; Fisher’s exact test; Table S3). The calf was observed riding the back of the mother on four separate occasions (Smultea et al., 2017). It should be noted that these results are limited by small and unequal sample sizes between treatments. Additionally, there is an issue of statistical independence as the Wilcoxon and Mann-Whitney U tests assume independent samples. Blue whale calf curiosity for vessels is not limited to our observations. For example, on 4 June 2018, drone footage was taken of a blue whale MC pair off Newport Beach, California (https://www.youtube.com/watch?time_continue=136&v=XtMv9RiX2_8&feature=emb_logo and <https://www.youtube.com/watch?reload=9&v=1dbyKDw27h8>).

Table S1. Summary of the inter-individual separation distances (estimated in meters based on reported average female blue whale [*Balaenoptera musculus*] body length of 23 m in the eastern North Pacific) between the blue whale mother and calf overall and in the presence and absence of the small vessel. This metric was estimated at 30-s intervals when both whales were in view at or below the water surface. n = number of 30-s intervals with separation distance sampled; SE = standard error.

	n	Min.	Max.	\bar{x}	SE
Vessel absent	25	0	23	0.303	0.065
Vessel present	51	0	45	0.355	0.063
Total	76	0	2	0.320	0.045

Table S2. Number of blow interval samples (n) and means (in min) for the blue whale mother and calf relative to vessel presence. SE = standard error.

	Mother			Calf		
	n	\bar{x}	SE	n	\bar{x}	SE
Vessel absent	2	2	0.07	8	0.3	0.19
Vessel present	5	1.2	0.43	9	0.6	0.16
Total	7	1.4	0.33	17	0.4	0.09

Table S3. Position of the blue whale calf relative to the mother recorded at 30-s sampling periods relative to vessel presence or absence while the pair were in view at or below the water surface. The calf was positioned predominantly on the left side of the mother (81%), and primarily rear left of the mother (56%).

Calf position	n	%	Vessel absent		Vessel present	
			n	%	n	%
Q1 – Front right	2	5	0	0	2	7
Q2 – Rear right	6	14	0	0	5	17
Q3 – Rear left	24	56	9	69	15	52
Q4 – Front left	11	25	4	31	7	24
Total	43	100	13	100	29	100

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