The Role of Season, Tide, and Diel Period in the Presence of Harbor Seal (*Phoca vitulina*) Breeding Vocalizations in Glacier Bay National Park and Preserve, Alaska

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Supplemental Tables

Supplemental Table 1. The pairwise comparisons of the hours per day in which harbor seal roar vocalizations were detected in different months indicate that June and July are significantly different than all other months. There was also a significant comparison between August and September, likely due to the "cool down" phase of vocalizations after the breeding season. * indicates statistical significance at $\alpha = 0.05$.

Contrasts	Estimate	SE	df	*t* ratio	*p* value
Jan-Feb	-3.57e-02	0.77	395.22	-0.05	1.00
Jan-March	-3.22e-02	0.75	395.22	-0.04	1.00
Jan-April	-4.33e-01	0.75	395.22	-0.57	1.00
Jan-May	-1.35	0.72	329.25	-1.87	0.78
Jan-June	-10.73	0.75	372.79	-14.26	< 0.001*
Jan-July	-16.98	0.73	346.97	-23.26	< 0.001*
Jan-Aug	-2.27	0.71	318.99	-3.18	0.07
Jan-Sept	6.78e-01	0.76	387.73	0.90	1.00
Jan-Oct	-2.83e-01	0.89	643.03	-0.32	1.00
Jan-Nov	-2.83e-01	0.90	645.27	-0.32	1.00
Jan-Dec	-2.83e-01	0.89	643.03	-0.32	1.00
Feb-March	3.46e-03	0.77	395.22	0.004	1.00
Feb-April	-3.98e-01	0.78	395.22	-0.51	1.00
Feb-May	-1.31	0.74	332.56	-1.77	0.83
Feb-June	-10.69	0.77	373.89	-13.84	< 0.001*
Feb-July	-16.94	0.75	349.40	-22.58	< 0.001*
Feb-Aug	-2.23	0.73	322.82	-3.04	0.10
Feb-Sept	7.13e-01	0.78	388.10	0.92	1.00
Feb-Oct	-2.48e-01	0.91	633.64	-0.27	1.00
Feb-Nov	-2.48e-01	0.92	636.01	-0.27	1.00
Feb-Dec	-2.48e-01	0.91	633.64	-0.27	1.00
March-April	-4.01e-01	0.76	395.22	-0.52	1.00
March-May	-1.31	0.72	329.25	-1.83	0.80
March-June	-10.70	0.75	372.79	-14.21	< 0.001*

March-July	-16.94	0.73	346.97	-23.22	< 0.001*
March-Aug	-2.24	0.71	318.99	-3.14	0.08
March-Sept	7.10e-01	0.76	387.73	0.94	1.00
March-Oct	-2.51e-01	0.89	643.03	-0.28	1.00
March-Nov	-2.51e-01	0.90	645.27	-0.28	1.00
March-Dec	-2.51e-01	0.89	643.03	-0.28	1.00
April-May	-9.14e-01	0.73	330.31	-1.26	0.98
April-June	-10.30	0.76	373.14	-13.57	< 0.001*
April-July	-16.54	0.74	347.75	-22.47	< 0.001*
April-Aug	-1.83	0.72	320.23	-2.55	0.31
April-Sept	1.11	0.76	387.85	1.46	0.95
April-Oct	1.50e-01	0.90	640.05	0.17	1.00
April-Nov	1.50e-01	0.91	642.33	0.17	1.00
April-Dec	1.50e-01	0.90	640.05	0.167	1.00
May-June	-9.38	0.69	257.41	-13.63	< 0.001*
May-July	-1.56e+01	0.66	219.25	-23.84	< 0.001*
May-Aug	-9.20e-01	0.65	214.41	-1.41	0.96
May-Sept	2.02	0.68	252.45	2.96	0.13
May-Oct	1.06	0.86	594.02	1.23	0.99
May-Nov	1.06	0.87	597.55	1.22	0.99
May-Dec	1.06	0.86	594.02	1.23	0.99
June-July	-6.25	0.68	240.10	-9.24	< 0.001*
June-Aug	8.46	0.69	252.15	12.33	< 0.001*
June-Sept	11.41	0.71	274.50	16.17	< 0.001*
June-Oct	10.45	0.89	616.92	11.73	< 0.001*
June-Nov	10.45	0.90	619.76	11.61	< 0.001*
June-Dec	10.45	0.89	616.92	11.73	< 0.001*
July-Aug	14.71	0.65	211.14	22.64	< 0.001*
July-Sept	17.65	0.66	225.37	26.62	< 0.001*
July-Oct	16.69	0.86	592.79	19.38	< 0.001*
July-Nov	16.69	0.87	596.38	19.18	< 0.001*
July-Dec	16.69	0.86	592.79	19.38	< 0.001*
Aug-Sept	2.95	0.68	242.98	4.36	0.0012*
Aug-Oct	1.98	0.86	585.29	2.32	0.46
Aug-Nov	1.98	0.87	589.09	2.29	0.48
Aug-Dec	1.98	0.86	585.29	2.32	0.46
Sept-Oct	-9.61e-01	0.88	610.71	-1.09	0.99
Sept-Nov	-9.61e-01	0.89	613.77	-1.08	1.00
Sept-Dec	-9.61e-01	0.88	610.71	-1.09	0.99
Oct-Nov	5.55e-16	0.99	739.17	0.00	1.00
Oct-Dec	5.55e-17	0.98	739.17	0.00	1.00
Nov-Dec	-5.00e-16	0.99	739.17	0.00	1.00

Supplemental Table 2. The pairwise comparisons of different years indicate that nonsequential years are significantly different. * indicates statistical significance at $\alpha = 0.05$.

Contrasts	Estimate	SE	df	*t* ratio	*p* value
2001-2002	-0.57	0.34	472.68	-1.68	0.34
2001-2007	-2.60	0.45	499.66	-5.74	< 0.001*
2001-2008	-1.79	0.43	465.61	-4.25	< 0.001*
2002-2007	-2.03	0.48	491.78	-4.2	< 0.001*
2002-2008	-1.23	0.46	489.09	-2.68	0.04*
2007-2008	0.81	0.49	506.82	1.66	0.35

Supplemental Table 3. Results from the generalized linear mixed effects model for the tidal and diel analysis show significance (indicated by *) during different light regimes at $\alpha = 0.05$.

	Variable name	Variance	SD		
Random effects	Day:(Month:Year)	2.49	1.57		
	Month:Year	1.67	1.29		
	Year	0.00	0.00		
	Variable name	**Estimate**	**SE**	**Z value**	***p* value**
Fixed effects	Intercept	1.19	0.53	2.26	0.024*
	Light (Day)	-0.39	0.19	-2.04	0.042*
	Light (Sunset)	0.66	0.32	2.10	0.036*
	Light (Night)	1.34	0.25	5.31	< 0.001*
	Tide	0.09	0.07	1.33	0.184
	Tide*Time	-0.01	0.01	-1.80	0.073
	Current Direction	0.03	0.35	0.07	0.94
	Spring vs Neap	-0.65	1.07	-0.61	0.54

Supplemental Table 4. The pairwise comparisons of different light regimes indicate that day and night were significantly different than sunrise and sunset. * indicates statistical significance at $\alpha = 0.05$.

Contrasts	Estimate	SE	z ratio	*p* value
Sunrise–Day	0.39	0.19	2.04	0.17
Sunrise–Sunset	-0.66	0.32	-2.10	0.15
Sunrise–Night	-1.34	0.25	-5.31	< 0.001*
Day–Sunset	-1.05	0.19	-5.57	< 0.001*
Day–Night	-1.73	0.30	-5.81	< 0.001*
Sunset–Night	-0.68	0.40	-1.68	0.34