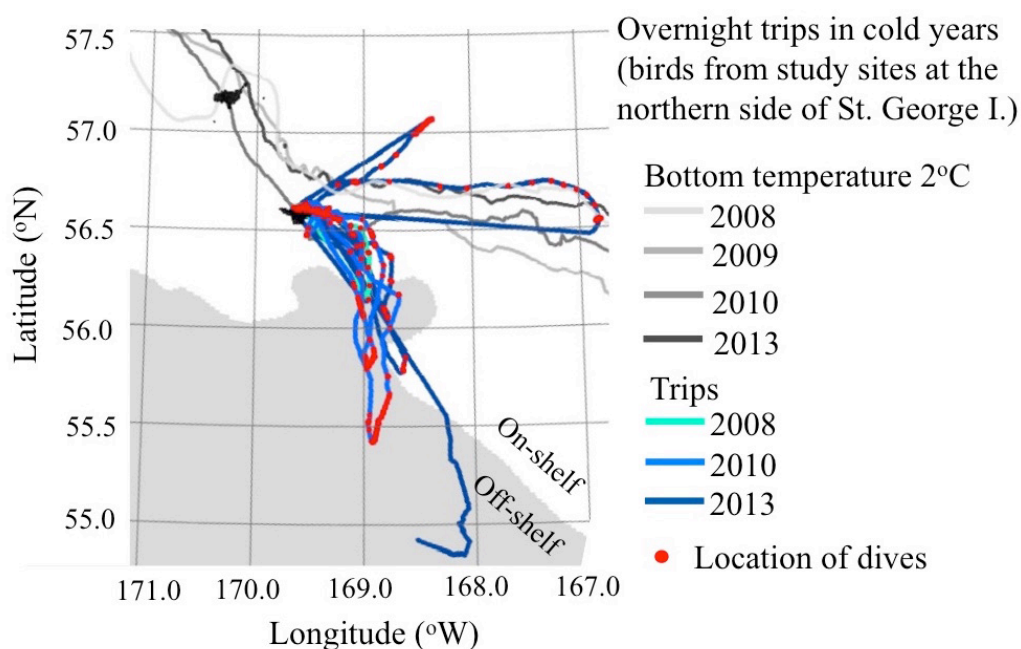


## Inter-annual climate variability affects foraging behaviour and nutritional state of thick-billed murres breeding in the southeastern Bering Sea

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**Figure S1.** Foraging tracks of thick-billed murres from study sites located on the northern side of St. George I., during overnight trips in cold years. Tracks from different years are shown in different colours. For cold years, the southernmost extent of the cold pool (where bottom temperature was 2 °C) is also shown for each year.

**Table S1.** Summary of foraging metrics for thick-billed murres breeding on St. George I. during 2004-2015. Mean±SD are shown.

Year	Environment NOAA Bottom temperature	Category	Sample size			Birds with accelerometer	Female	Male	Unknown sex	Dive data Daily dive time (h/d)*	TDR data		Trip duration (h)	
			Birds with dive data	Birds with TDR only	Birds with GPS+TDR						Number of trips		Overnight	Day
2004	3.80	Warm	12			12	6	4	2	1.65 ± 0.38				
2006	2.35	Intermediate	13	8		5	8	5		2.04 ± 0.57	25	16	14.3 ± 2.7	4.2 ± 2.6
2007	1.59	Cold	19	15		4	9	10		2.93 ± 0.77	41	64	22.1 ± 11.7	4.8 ± 3.3
2008	1.61	Cold	21	19	2		14	7		3.00 ± 1.22	29	20	24.1 ± 14.0	3.4 ± 3.0
2009	1.37	Cold	27	20	7		16	11		2.83 ± 0.10	45	7	16.9 ± 8.9	4.1 ± 3.5
2010	1.29	Cold	10		10		6	4		2.67 ± 1.38				
2013	1.76	Cold	14		5	9	5	5	4	2.33 ± 1.10				
2014	3.51	Warm	22		10	12	10	1	11	2.11 ± 0.74				
2015	4.08	Warm	18		6	12	9	9		2.43 ± 0.92				

ND: No data, we were not able to determine day or overnight trips due to limited coverage of data.

\*Birds with depth records > 24 hours were analyzed.

\*\* We were not able to categorize off-shelf or on-shelf for 4 and 6 overnight trips in 2009 and 2010, and 1 and 1 day trips in 2009 and 2013, respectively, due to limited coverage of GPS data.

\*\*\* Only 1 trip was available for trip duration at maximum distance from the colony due to limited coverage of GPS data.

**Table S1 (continued).**

GPS data										Acceleration data			
Number of trips (% off-shelf trips)		Trip duration (h)		Maximum distance from the colony (km)		% Off shelf dives		% dives in cold pool		Number of trips		Trip duration (h)	
Overnight	Day	Overnight	Day	Overnight	Day	Overnight	Day	Overnight	Day	Overnight	Day	Overnight	Day
										16	35	12.3 ± 5.0	5.2 ± 3.9
										5	6	12.0 ± 4.7	7.2 ± 2.5
										4	6	15.4 ± 2.4	6.1 ± 3.5
2 (50)	ND	19.4 and 95.4	ND	13.9***	ND	0.0 and 4.3	ND	0.0 and 0.0	ND				
8 (100)**	2 (0)**	21.7 ± 11.4	4.0 and 6.6	97.0 ± 23.8	18.4***	67.3 ± 38.2	0***	0 ± 0	0 ± 0				
16 (30)**	6 (0)	17.9 ± 13.5	4.1 ± 1.7	48.7 ± 43.6	12.4 ± 10.1	27.7 ± 44.8	0 ± 0	30.6 ± 47.1	50.0 ± 54.8				
8 (37.5)	2 (0)**	18.4 ± 10.8	5.9 and 8.5	100.6 ± 67.4	15.3***	7.9 ± 19.5	0 and 0	20.2 ± 40.0	0.0 and 0.0	6	3	19.5 ± 5.2	8.7 ± 3.0
12 (0)	6 (0)	17.1 ± 4.7	5.8 ± 4.1	60.3 ± 25.4	25.7 ± 9.7	0 ± 0	0 ± 0	0 ± 0	0 ± 0	10	11	16.1 ± 5.3	6.3 ± 4.2
6 (16.7)	2 (0)	15.8 ± 4.6	13.0 and 4.3	56.9 ± 20.1	37.3 and 33.1	6.5 ± 16.0	0 and 0	0 ± 0	0 ± 0	9	6	19.3 ± 6.5	5.0 ± 4.5

**Table S2.** Details on the loggers deployed for each year.

Year	Logger type	Model name	Number of loggers deployed	Number of loggers recovered	Number of birds with data available	Yearly recovery rates (%)	Reference
2004	Accelerometer	UME-D2GT	18	12	12	66.7	Takahashi et al. (2008)
2006	Accelerometer	UME-D2GT	7	7	5	93.8	Kokubun et al. (2010)
	TDR	CEFAS-G5	9	8	8		Ito et al. (2010)
2007	Accelerometer	UME-D2GT	9	4	4	75	Kokubun et al. (2010)
	TDR	CEFAS-G5	19	17	15		Ito (2011)
2008	GPS-TDR	GiPSy+LAT2500	6	3	2	63.4	Paredes et al. (2015)
	GPS only	GiPSy	5	4	4		Paredes et al. (2015)
	TDR	CEFAS-G5	28	19	19		Young et al. (2015)
	Accelerometer	UME-D2GT	2	0	0		
2009	GPS-TDR	GiPSy+LAT2500	26	15	10	61	Paredes et al. (2015)
	GPS only	GiPSy	2	0	0		Paredes et al. (2015)
	TDR	CEFAS-G5	31	21	20		Young et al. (2015)
2010	GPS-TDR	GiPSy+LAT2500	41	29	15	70.7	Paredes et al. (2015)
2013	GPS-TDR	GiPSy+LAT1500	7	6	5	80	Yamamoto et al. (2016)
	GPS only	GiPSy	4	3	2		Yamamoto et al. (2016)
	Accelerometer	ORI-D3GT	14	11	9		This study
2014	GPS-TDR	GiPSy+LAT1500	14	11	10	89.7	Yamamoto et al. (2016)
	Accelerometer	ORI-D3GT	15	15	12		Kokubun et al. (2016)
2015	GPS-TDR	CatTraQ+LAT1500	6	6	6	90.9	This study
	Accelerometer	ORI-D3GT	10	8	6		This study
	Accelerometer	Axy-depth	6	6	6		This study

Specifications	Logger type	Model	Mass (g)	Dimensions	Sampling intervals for depth	Sampling intervals for acceleration	Sampling intervals for GPS
Accelerometers		UME-D2GT	17	15x53mm	1 s	16 or 64 Hz	
		ORI-D3GT	10	12x45mm	1 s		
		Axy-depth	7	12x31x11mm	1 s		
GPS		GiPSy2	10-14	47x24x11mm		25 Hz	1-2 s (2008 to 2010), 5 fixes per minute
		GiPSy4	15-16	46x27x11mm			
		CatTraQ	16	47x26x11mm			
		Cefas-G5	2.7	8x30mm	2 s		
TDR		LAT2500 (2008, 2009)	3.6	8x35mm	1s when depth >5m		
		LAT2500 (2010)	3.6	8x35mm	3s		
		LAT1500	3.3	8x32mm	1 s		

**Table S3.** Chick diet of thick-billed murres breeding on St. George I. during 2004-2015.

Food item	2004		2006		2007		2008		2009		2010		2013		2014		2015	
	Number	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Walleye pollock <i>Gadus chalcogrammus</i>	7	23.3	9	18.0	30	15.6	2	3.2	0	0.0	5	6.5	4	30.8	9	25.7	22	62.9
Pacific sandlance <i>Ammodytes hexapterus</i>	16	53.3	0	0.0	1	0.5	3	4.8	3	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Pricklebacks (Stichaeidae)*	0	0.0	2	4.0	8	4.2	22	34.9	16	12.7	4	5.2	0	0.0	1	2.9	0	0.0
Sculpins (Cottoidei)*	0	0.0	1	2.0	18	9.4	0	0.0	10	7.9	8	10.4	2	15.4	2	5.7	0	0.0
Flatfish (Pleuronectidae)*	1	3.3	10	20.0	6	3.1	0	0.0	14	9.5	10	13.0	0	0.0	0	0.0	0	0.0
Other benthic fish*,**	0	0.0	0	0.0	0	0.0	3	4.8	0	0.0	1	1.3	0	0.0	0	0.0	0	0.0
Other fishes	3	10.0	14	28.0	11	5.7	8	12.7	7	9.5	5	7.8	1	7.7	10	28.6	6	17.1
Cephalopods (Gonatidae)	3	10.0	14	28.0	118	61.5	25	39.7	75	59.5	44	57.1	5	38.5	12	34.3	7	20.0
Other invertebrates	0	0.0	0	0.0	0	0.0	0	0.0	1	0.8	0	0.0	1	7.7	1	2.9	0	0.0
Total	30	100.0	50	100.0	192	100.0	63	100.0	126	100.0	77	100.0	13	100.0	35	100.0	35	100.0

\* Categorized here as benthic fish

\*\* Other benthic fish: Lump sucker x2, Prowfish x 1 for 2008, Eelpout x 1 for 2010.

**Table S4.** Summary of baseline corticosterone measurements.

Year	Environment	Sample size		Mean log	
	NOAA Bottom temperature	No. birds with CORT data	No. birds with CORT, sex, and dive data	CORT (ng/ml)	SD log CORT
2003	4.27	58	0	0.334404	0.190482
2004	3.80	41	10	0.592937	0.284402
2005	4.09	19	0	0.491358	0.334775
2008	1.61	76	18	0.634861	0.24438
2009	1.37	122	25	0.694407	0.351459
2010	1.29	107	8	0.706306	0.256117
2011	2.85	8	0	0.895156	0.259033
2013	1.76	20	8	0.775686	0.23132
2014	3.51	22	8	0.367658	0.272483
2015	4.08	36	10	0.588542	0.327629