

Combining hard-part and DNA analyses of scats with biologging and stable isotopes can reveal different diet compositions and feeding strategies within a fur seal population

T. Jeanniard-du-Dot*, A. C. Thomas, Y. Cherel, A. W. Trites, C. Guinet

*Corresponding author: tiphainejdd@gmail.com

Marine Ecology Progress Series 584: 1–16 (2017)

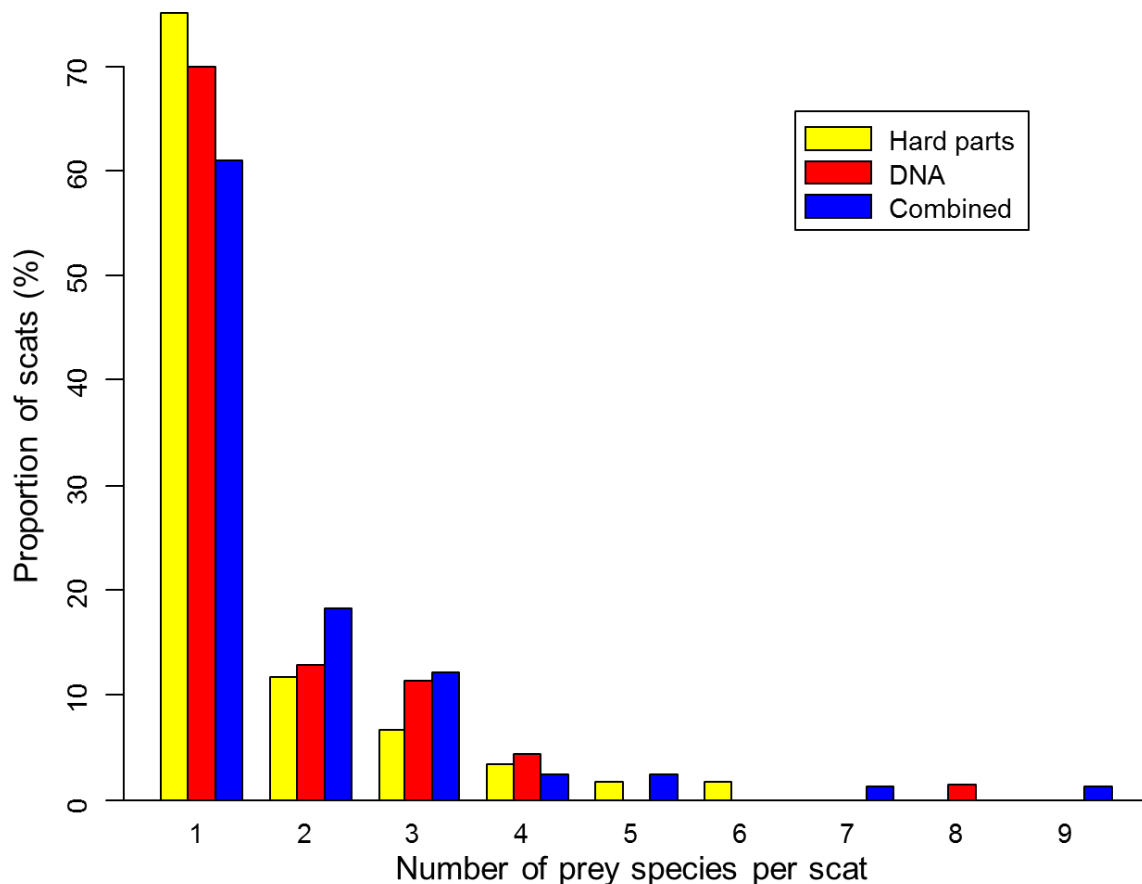


Fig. S1. Number of prey species detected in scats depending on the analytical method used, hard-part remains (in yellow, $n = 60$), DNA analyses in scat organic matter (in red, $n = 70$) or combined results from both methods (in blue, $n = 81$). The difference in sample size is due to the fact that no identifiable hard-parts were recovered in 38 of the scats and no DNA was detected in 28 of the scats (collected on Reef rookery St Paul Island, Bering Sea, Alaska in Aug-Sept 2011).

Table S1. Frequency of occurrence (FO) and split-sample frequency of occurrence (SSFO) of different prey items in northern fur seals diet measured either by morphological identification of hard-part remains or by DNA sequencing analyses in scats collected on Reef rookery (ST Paul Island, Bering Sea, Alaska) during the breeding season 2011. The mean percent of DNA sequences specific to each prey in the scats (% Seq.) is also indicated.

Group	Species/taxon name	Hard-parts		DNA			Combined	
		FO (%)	SSFO (%)	FO (%)	SSFO (%)	% Seq.	FO (%)	SSFO (%)
Gadid	Walleye Pollock	75.00	62.75	91.43	74.58	80.63	87.65	65.31
	Pacific Cod	8.33	7.00	7.14	2.50	2.04	11.11	4.26
Cephalopod	Unidentified Squid/Octopus	20.00	12.28				13.58	7.52
	Boreopacific Gonatid squid			2.86	1.61	2.10	2.47	1.37
Salmon	All salmon combined	15.00	6.03	15.71	7.80	3.92	17.28	6.53
	Chum Salmon			10.00	5.42	3.49	8.64	3.94
	Pink Salmon			5.71	2.38	0.43	6.17	2.00
	Unidentified Salmon	15.00	6.03				2.47	0.59
Hexagrammid	Atka Mackerel	10.00	2.92	4.29	1.37	1.39	7.41	2.03
	Kelp Greenling	3.33	0.72	10.00	3.87	3.94	8.64	3.13
	Whitespotted Greenling			1.43	0.36	0.09	1.23	0.25
Mesopelagic	Northern Smoothtongue	5.00	2.42	4.29	1.13	1.47	4.94	1.27
	Northern Lanternfish			1.43	0.18	0.04	1.23	0.14
Forage	Pacific Sand Lance	1.67	0.83	4.29	1.67	0.44	3.70	1.23
	Pacific Sandfish	1.67	0.42	2.86	0.83	1.32	2.47	0.66
	Capelin	1.67	0.28				1.23	0.18
Flatfish	Arrowtooth Flounder	1.67	0.28	4.29	1.19	0.62	3.70	0.90
	Greenland Halibut			1.43	0.36	0.02	1.23	0.18
Other	Rockfish	1.67	0.33				1.23	0.25
	Sablefish			4.29	1.61	0.93	3.70	1.37
	Prowfish			2.86	0.95	1.04	2.47	0.72
	Non-fish	3.33	2.50				2.47	1.85
	Worm	3.33	1.25				2.47	0.86

Table S2. $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values in plasma and red blood cells (RBC) as well as mass percent of carbon and nitrogen of 20 lactating northern fur seals breeding on St Paul Island, Bering Sea, Alaska. Blood samples were taken either before or after a single foraging trip at sea.

Sampling time	Tissue	ID	Foraging location	$\delta^{13}\text{C}$ (‰)	$\delta^{15}\text{N}$ (‰)	C (%)	N (%)	C/N mass ratio
Before	Plasma	1	neritic	-18.73	16.46	45.80	12.40	3.69
Before	Plasma	5	neritic	-18.81	16.79	45.48	12.05	3.77
Before	Plasma	6	outlier	-19.69	14.23	46.14	12.21	3.78
Before	Plasma	7	neritic	-18.37	18.16	45.46	11.94	3.81
Before	Plasma	8	neritic	-18.94	17.35	46.06	12.03	3.83
Before	Plasma	9	neritic	-18.54	17.56	45.08	12.04	3.74
Before	Plasma	12	neritic	-19.37	16.56	43.23	11.37	3.80
Before	Plasma	13	neritic	-18.47	17.41	46.36	12.17	3.81
Before	Plasma	14	neritic	-19.38	14.96	46.18	12.40	3.73
Before	Plasma	17	neritic	-18.62	16.81	45.91	12.32	3.73
Before	Plasma	18	neritic	-18.33	17.52	43.87	12.19	3.60
Before	Plasma	19	neritic	-18.74	17.43	44.01	11.52	3.82

Sampling time	Tissue	ID	Foraging location	$\delta^{13}\text{C}$ (‰)	$\delta^{15}\text{N}$ (‰)	C (%)	N (%)	C/N mass ratio
Before	Plasma	2	oceanic	-19.69	13.89	45.33	12.15	3.73
Before	Plasma	3	oceanic	-19.65	15.03	46.13	12.13	3.80
Before	Plasma	4	oceanic	-19.54	14.60	45.97	12.07	3.81
Before	Plasma	10	oceanic	-19.13	15.91	45.89	12.48	3.68
Before	Plasma	11	oceanic	-19.78	14.90	44.60	11.43	3.90
Before	Plasma	15	oceanic	-19.32	14.90	46.93	12.80	3.67
Before	Plasma	16	oceanic	-19.44	15.05	47.06	12.78	3.68
Before	Plasma	20	oceanic	-19.56	15.13	44.15	11.58	3.81
Before	RBC	1	neritic	-19.34	15.36	56.92	17.05	3.34
Before	RBC	5	neritic	-19.33	15.11	50.64	15.09	3.36
Before	RBC	6	outlier	-19.94	12.08	50.73	15.24	3.33
Before	RBC	7	neritic	-18.78	16.25	48.03	14.11	3.40
Before	RBC	8	neritic	-19.16	15.73	50.41	15.06	3.35
Before	RBC	9	neritic	-18.92	15.34	50.58	15.10	3.35
Before	RBC	12	neritic	-19.54	14.38	52.00	15.56	3.34
Before	RBC	13	neritic	-18.88	15.89	51.15	15.23	3.36
Before	RBC	14	neritic	-19.70	14.87	50.18	14.93	3.36
Before	RBC	17	neritic	-19.24	13.77	49.91	14.95	3.34
Before	RBC	18	neritic	-19.12	16.01	49.86	14.86	3.36
Before	RBC	19	neritic	-19.52	14.95	47.12	13.98	3.37
Before	RBC	2	oceanic	-20.01	11.70	50.90	15.12	3.37
Before	RBC	3	oceanic	-19.60	14.46	51.45	15.32	3.36
Before	RBC	4	oceanic	-19.90	12.47	51.10	15.23	3.36
Before	RBC	10	oceanic	-19.70	15.55	50.17	15.01	3.34
Before	RBC	11	oceanic	-19.89	12.90	50.99	15.05	3.39
Before	RBC	15	oceanic	-19.28	15.10	49.96	14.92	3.35
Before	RBC	16	oceanic	-19.46	14.95	50.06	14.98	3.34
Before	RBC	20	oceanic	-19.53	15.11	46.20	13.69	3.37
After	Plasma	1	neritic	-18.85	16.49	45.53	12.24	3.72
After	Plasma	5	neritic	-18.55	16.85	46.16	12.44	3.71
After	Plasma	6	outlier	-19.72	15.04	47.61	12.43	3.83
After	Plasma	7	neritic	-18.20	18.01	46.17	12.13	3.81
After	Plasma	8	neritic	-18.85	17.78	45.47	11.84	3.84
After	Plasma	9	neritic	-19.19	17.08	45.20	11.95	3.78
After	Plasma	12	neritic	-19.02	16.89	47.08	12.20	3.86
After	Plasma	13	neritic	-18.74	17.62	43.22	11.36	3.80
After	Plasma	14	neritic	-19.00	16.76	45.51	12.18	3.74
After	Plasma	17	neritic	-18.82	17.00	43.67	11.28	3.87
After	Plasma	18	neritic	-18.32	18.58	45.38	12.16	3.73
After	Plasma	19	neritic	-18.93	17.71	44.20	11.30	3.91
After	Plasma	2	oceanic	-19.79	14.04	46.04	12.01	3.83
After	Plasma	3	oceanic	-19.60	15.17	38.27	10.00	3.83
After	Plasma	4	oceanic	-19.58	14.48	43.69	11.49	3.80
After	Plasma	10	oceanic	-19.63	14.98	47.07	12.61	3.73
After	Plasma	11	oceanic	-19.64	14.76	46.90	12.33	3.80
After	Plasma	15	oceanic	-19.49	14.58	47.60	12.70	3.75
After	Plasma	16	oceanic	-19.28	15.58	45.29	11.92	3.80
After	Plasma	20	oceanic	-19.51	15.33	44.15	11.72	3.77