

**Table S1** Calibration coefficients derived from mink fed seal oil used in our QFASA model to estimate the prey proportions of Beaufort Sea beluga whales. Calibration coefficients were included in the qfasar package (Bromaghin 2017) and experimentally derived in Thiemann et al. (2008).

Fatty acid	Calibration coefficient
16:2n-6 <sup>a</sup>	0.795424
16:2n-4 <sup>b</sup>	0.499808
16:3n-4	0.254222
18:2n-6	1.29252
18:2n-4	0.725154
18:3n-6	0.746682
18:3n-4	1.558122
18:3n-3	0.697619
18:4n-3	0.297257
18:4n-1	0.483586
20:1n-11	4.524062
20:1n-9	1.269841
20:1n-7	1.200585
20:2n-6	0.917282
20:3n-6	0.726534
20:4n-6	0.438789
20:3n-3	0.683673
20:4n-3	0.510737
20:5n-3	0.140686
22:1n-11	0.33214
22:1n-9	0.539342
22:1n-7	0.649356
21:5n-3	0.459575
22:5n-6	0.8115
22:6n-3	0.594973

<sup>a</sup> Verified using mass spectrometry as 16:2n-6 and Applegate (2007), but coincided with 16:1n-5 in Thiemann et al. (2008).

<sup>b</sup> Verified using mass spectrometry as 16:2n-4 and Applegate (2007), but coincided with 16:3n-6 in Thiemann et al. (2008).

### Literature Cited

- Applegate BL (2007) Extraction, derivatization, and analysis of fatty acid methyl ester (FAME) in tissue homogenates and blubber by ASE and gas chromatography method description for FAME Analysis.
- Bromaghin JF (2017) Qfasar: Quantitative Fatty Acid Signature Analysis in R. R package version 1.2.0.
- Thiemann GW, Iverson S, Stirling I (2008) Polar bear diets and arctic marine food webs: Insights from fatty acid analysis. *Ecol Monogr* 78:591–613.

**Table S2.** Percentages (%) of fatty acids contributing to over 80% of the dissimilarities between potential prey of EBS beluga whales produced by similarity percentages routine analysis (SIMPER).

Species 1	Species 2	20:1n-9	20:1n-7	20:4n-6	20:5n-3	22:1n-11	22:6n-3	Total
Isopod	Green shrimp				67.29		28.61	95.91
Isopod	Polar shrimp				53.12		42.09	95.22
Isopod	Circumpolar eualid				55.55		35.74	91.29
Isopod	Octopus	23.7			22.81		46.5	93.01
Isopod	Arctic staghorn sculpin				51.69		34.57	86.27
Isopod	Kelp snailfish	39.57			14.56		35.4	89.54
Isopod	Stout eelblenny				34.48		52.67	87.16
Isopod	Arctic alligatorfish		19.68		43.52		24.84	88.04
Isopod	Adolf's eelpout	10.99			26.92		51.36	89.27
Isopod	Canadian Eelpout				73.55		14.09	87.64
Isopod	Arctic cod	31.33			10.15	39.29		80.78
Isopod	Capelin	37.24			12.29	40.69		90.22
Isopod	Greenland halibut	50.53			19.47	16.55		86.55
Green shrimp	Polar shrimp				37.96		56.09	94.05
Green shrimp	Circumpolar eualid				55.94		33.6	89.54
Green shrimp	Octopus	22.37			40.29		31.77	94.44
Green shrimp	Arctic staghorn sculpin				78.54		18.37	96.92
Green shrimp	Adolf's eelpout				69.78		17.15	86.92
Green shrimp	Kelp snailfish	38.2			43.4			81.6
Green shrimp	Stout eelblenny				78.2		16.23	94.42
Green shrimp	Arctic alligatorfish				69.34		19.72	89.07
Green shrimp	Canadian Eelpout				59.52		36.14	95.66
Green shrimp	Capelin	26.09			37.18	29.38		92.65
Green shrimp	Arctic cod	22.84			31.44	29.56		83.84
Green shrimp	Greenland halibut	30.64			50.67			81.3
Polar shrimp	Circumpolar eualid				44.2		43.13	87.33
Polar shrimp	Octopus	23.88			36.44		33.51	93.83
Polar shrimp	Adolf's eelpout				61.5		22.88	84.38
Polar shrimp	Canadian Eelpout				41		54.53	95.53
Polar shrimp	Arctic staghorn sculpin				66.04		30.22	96.26
Polar shrimp	Kelp snailfish	43.29			37.89			81.18
Polar shrimp	Arctic alligatorfish				55.43		31.58	87.01
Polar shrimp	Stout eelblenny				69.57		22.74	92.32
Polar shrimp	Arctic cod	23.23			25.87	29.85	12.27	91.22
Polar shrimp	Greenland halibut	31.95			44.66	10.93		87.54
Polar shrimp	Capelin	26.85			32.25	30.04		89.13
Circumpolar eualid	Octopus	21			34.87		38.16	94.03
Circumpolar eualid	Arctic staghorn sculpin				69.35		25.13	94.48

Circumpolar eualid	Arctic alligatorfish				55.65		25.87	81.52
Circumpolar eualid	Canadian eelpout				48.61		43.53	92.14
Circumpolar eualid	Kelp snailfish	42.76			35.87		15.05	93.68
Circumpolar eualid	Stout eelblenny				68.41		22.84	91.26
Circumpolar eualid	Adolf's eelpout				60.48		24.2	84.67
Circumpolar eualid	Arctic cod	24.06			24.89	31.73		80.69
Circumpolar eualid	Greenland halibut	34.44			45.86			80.3
Circumpolar eualid	Capelin	28.08			31.74	31.96		91.77
Octopus	Arctic alligatorfish	24.9			18.55		44.77	88.22
Octopus	Kelp snailfish				29.03		55.35	84.38
Octopus	Adolf's eelpout	16.6			23.51		51.46	91.57
Octopus	Canadian eelpout	23.26			25.92		43.9	93.09
Octopus	Arctic staghorn sculpin	24.26			23.33		45.3	92.89
Octopus	Stout eelblenny	28.05			22.46		41.28	91.79
Octopus	Arctic cod				17.14	27.7	38.09	82.93
Octopus	Capelin				21	33.38	35.33	89.71
Octopus	Greenland halibut				29.94	10.11	47.02	87.08
Arctic staghorn sculpin	Arctic alligatorfish		33.49		28.31		29.04	90.84
Arctic staghorn sculpin	Stout eelblenny				43.51		46.52	90.02
Arctic staghorn sculpin	Kelp snailfish	50.36			12.52		26.87	89.75
Arctic staghorn sculpin	Adolf's eelpout			12.1	23.13		48.09	83.32
Arctic staghorn sculpin	Canadian Eelpout				70.8		22.94	93.74
Arctic staghorn sculpin	Capelin	36.68				46.57		83.25
Arctic staghorn sculpin	Greenland halibut	53.49			17.47	20.48		91.55
Arctic staghorn sculpin	Arctic cod	30.37			6.77	44.75		81.88
Canadian Eelpout	Adolf's eelpout	17.59		20.53	18.06		37.43	93.61
Canadian Eelpout	Kelp snailfish	41.89			18.97		30.29	91.16
Canadian Eelpout	Arctic alligatorfish		23.95		57.35			81.3
Canadian Eelpout	Stout eelblenny				40.05		54.18	94.23
Canadian Eelpout	Greenland halibut	44.13			33.98	15.93		94.04
Canadian Eelpout	Capelin	33.48			21.94	39.63		95.05
Canadian Eelpout	Arctic cod	29.08			16.51	39.73		85.32
Adolf's eelpout	Kelp snailfish	41.78		12.39			30.22	84.39
Adolf's eelpout	Arctic alligatorfish	12.57	20.93	8.98			46.49	88.97
Adolf's eelpout	Stout eelblenny	17.59		20.53	18.06		37.43	93.61
Adolf's eelpout	Greenland halibut	42.59			13.3	18.9	14.32	89.11
Adolf's eelpout	Capelin	28.46				47.3	10.03	85.79
Adolf's eelpout	Arctic cod	22.29			6.13	43.42	13.77	85.61
Stout eelblenny	Kelp snailfish	67.27					13.12	80.39
Stout eelblenny	Arctic alligatorfish		28.85		19.72		43.46	92.03
Stout eelblenny	Greenland halibut	51.26			21.53	17.39		90.18

Stout eelblenny	Capelin	36.69			12.87	42.68		92.25
Stout eelblenny	Arctic cod	30.91				41.54	9.38	81.38
Kelp snailfish	Arctic alligatorfish	46.78	8.45				30.13	85.35
Kelp snailfish	Greenland halibut				30.51	18.11	34.81	83.44
Kelp snailfish	Capelin				15.66	52.88	21.94	90.48
Kelp snailfish	Arctic cod	10.46			7.87	42.64	25.96	86.93
Arctic alligatorfish	Greenland halibut	55.73			8.25	21		84.97
Arctic alligatorfish	Capelin	38.95				46.89		85.84
Arctic alligatorfish	Arctic cod	33.17	5.81			46.12		85.1
Greenland halibut	Capelin	12.49				68.09		80.58
Greenland halibut	Arctic cod	22.93	13.32		11.91	33.75		81.92
Capelin	Arctic cod	26.76	11.83		12.72	25.51	13.67	90.48

**Table S3.** Results from a Tukey HSD multiple comparisons of mean lipid content. Diff is the difference in the observed means, lwr is the lower point of the interval, upr is the upper end point and p adj is the p-value after adjustment for multiple comparisons.

Species comparison	diff	lwr	upr	p adj
Arctic alligatorfish-Adolf's eelpout	-0.31	-1.61	0.98	1.00
Arctic cod-Adolf's eelpout	1.59	0.58	2.60	0.00
Arctic staghorn sculpin-Adolf's eelpout	-0.29	-1.59	1.00	1.00
Canadian eelpout-Adolf's eelpout	0.44	-0.99	1.87	1.00
Capelin-Adolf's eelpout	1.46	0.30	2.61	0.00
Circumpolar eualid-Adolf's eelpout	-0.70	-1.89	0.50	0.79
Green shrimp-Adolf's eelpout	-1.11	-2.29	0.07	0.09
Greenland halibut-Adolf's eelpout	1.61	0.61	2.61	0.00
Isopod-Adolf's eelpout	-1.62	-2.82	-0.42	0.00
Kelp snailfish-Adolf's eelpout	0.56	-0.45	1.57	0.83
Octopus-Adolf's eelpout	-0.19	-1.37	0.99	1.00
Polar shrimp-Adolf's eelpout	-1.28	-2.46	-0.10	0.02
Stout eelblenny-Adolf's eelpout	0.04	-1.12	1.19	1.00
Arctic cod-Arctic alligatorfish	1.90	0.89	2.91	0.00
Arctic staghorn sculpin-Arctic alligatorfish	0.02	-1.27	1.32	1.00
Canadian eelpout-Arctic alligatorfish	0.75	-0.67	2.18	0.88
Capelin-Arctic alligatorfish	1.77	0.61	2.92	0.00
Circumpolar eualid-Arctic alligatorfish	-0.38	-1.58	0.82	1.00
Green shrimp-Arctic alligatorfish	-0.79	-1.98	0.39	0.58
Greenland halibut-Arctic alligatorfish	1.92	0.93	2.92	0.00
Isopod-Arctic alligatorfish	-1.31	-2.51	-0.11	0.02
Kelp snailfish-Arctic alligatorfish	0.87	-0.13	1.88	0.17
Octopus-Arctic alligatorfish	0.12	-1.06	1.31	1.00
Polar shrimp-Arctic alligatorfish	-0.97	-2.15	0.22	0.25
Stout eelblenny-Arctic alligatorfish	0.35	-0.80	1.50	1.00
Arctic staghorn sculpin-Arctic cod	-1.88	-2.89	-0.87	0.00
Canadian eelpout-Arctic cod	-1.15	-2.33	0.03	0.06
Capelin-Arctic cod	-0.13	-0.96	0.69	1.00
Circumpolar eualid-Arctic cod	-2.28	-3.17	-1.40	0.00
Green shrimp-Arctic cod	-2.70	-3.56	-1.83	0.00
Greenland halibut-Arctic cod	0.02	-0.56	0.61	1.00
Isopod-Arctic cod	-3.21	-4.10	-2.32	0.00
Kelp snailfish-Arctic cod	-1.03	-1.63	-0.42	0.00
Octopus-Arctic cod	-1.78	-2.64	-0.92	0.00
Polar shrimp-Arctic cod	-2.87	-3.73	-2.01	0.00
Stout eelblenny-Arctic cod	-1.55	-2.38	-0.73	0.00
Canadian eelpout-Arctic staghorn sculpin	0.73	-0.70	2.16	0.90
Capelin-Arctic staghorn sculpin	1.75	0.59	2.90	0.00

Circumpolar eualid-Arctic staghorn sculpin	-0.40	-1.60	0.79	1.00
Green shrimp-Arctic staghorn sculpin	-0.82	-2.00	0.37	0.53
Greenland halibut-Arctic staghorn sculpin	1.90	0.91	2.90	0.00
Isopod-Arctic staghorn sculpin	-1.33	-2.53	-0.13	0.02
Kelp snailfish-Arctic staghorn sculpin	0.85	-0.16	1.86	0.20
Octopus-Arctic staghorn sculpin	0.10	-1.08	1.28	1.00
Polar shrimp-Arctic staghorn sculpin	-0.99	-2.17	0.19	0.22
Stout eelblenny-Arctic staghorn sculpin	0.33	-0.83	1.48	1.00
Capelin-Canadian eelpout	1.02	-0.28	2.32	0.32
Circumpolar eualid-Canadian eelpout	-1.13	-2.47	0.21	0.20
Green shrimp-Canadian eelpout	-1.55	-2.87	-0.22	0.01
Greenland halibut-Canadian eelpout	1.17	0.01	2.33	0.05
Isopod-Canadian eelpout	-2.06	-3.40	-0.72	0.00
Kelp snailfish-Canadian eelpout	0.12	-1.05	1.29	1.00
Octopus-Canadian eelpout	-0.63	-1.95	0.70	0.94
Polar shrimp-Canadian eelpout	-1.72	-3.04	-0.39	0.00
Stout eelblenny-Canadian eelpout	-0.40	-1.70	0.90	1.00
Circumpolar eualid-Capelin	-2.15	-3.20	-1.11	0.00
Green shrimp-Capelin	-2.56	-3.59	-1.54	0.00
Greenland halibut-Capelin	0.16	-0.65	0.96	1.00
Isopod-Capelin	-3.08	-4.12	-2.03	0.00
Kelp snailfish-Capelin	-0.89	-1.71	-0.08	0.02
Octopus-Capelin	-1.65	-2.67	-0.62	0.00
Polar shrimp-Capelin	-2.74	-3.76	-1.71	0.00
Stout eelblenny-Capelin	-1.42	-2.41	-0.43	0.00
Green shrimp-Circumpolar eualid	-0.41	-1.49	0.66	0.99
Greenland halibut-Circumpolar eualid	2.31	1.44	3.17	0.00
Isopod-Circumpolar eualid	-0.92	-2.02	0.17	0.20
Kelp snailfish-Circumpolar eualid	1.26	0.37	2.14	0.00
Octopus-Circumpolar eualid	0.51	-0.57	1.58	0.95
Polar shrimp-Circumpolar eualid	-0.58	-1.66	0.49	0.86
Stout eelblenny-Circumpolar eualid	0.73	-0.31	1.78	0.50
Greenland halibut-Green shrimp	2.72	1.87	3.56	0.00
Isopod-Green shrimp	-0.51	-1.59	0.56	0.94
Kelp snailfish-Green shrimp	1.67	0.81	2.53	0.00
Octopus-Green shrimp	0.92	-0.14	1.97	0.17
Polar shrimp-Green shrimp	-0.17	-1.23	0.89	1.00
Stout eelblenny-Green shrimp	1.14	0.12	2.17	0.01
Isopod-Greenland halibut	-3.23	-4.10	-2.36	0.00
Kelp snailfish-Greenland halibut	-1.05	-1.63	-0.47	0.00
Octopus-Greenland halibut	-1.80	-2.65	-0.96	0.00

Polar shrimp-Greenland halibut	-2.89	-3.74	-2.05	0.00
Stout eelblenny-Greenland halibut	-1.57	-2.38	-0.77	0.00
Kelp snailfish-Isopod	2.18	1.30	3.06	0.00
Octopus-Isopod	1.43	0.35	2.51	0.00
Polar shrimp-Isopod	0.34	-0.73	1.42	1.00
Stout eelblenny-Isopod	1.66	0.61	2.70	0.00
Octopus-Kelp snailfish	-0.75	-1.61	0.11	0.16
Polar shrimp-Kelp snailfish	-1.84	-2.70	-0.98	0.00
Stout eelblenny-Kelp snailfish	-0.52	-1.34	0.30	0.66
Polar shrimp-Octopus	-1.09	-2.15	-0.03	0.04
Stout eelblenny-Octopus	0.23	-0.80	1.25	1.00
Stout eelblenny-Polar shrimp	1.32	0.29	2.34	0.00

**Table S4.** The distribution of leave-one-prey-out estimates by prey groups (rows) for 12 potential prey species of EBS beluga whales.

	Adolf's eelpout	Arctic alligatorfish	Canadian eelpout	Capelin	Arctic cod	Decapod	Stout eelblenny	Greenland halibut	Isopod	Octopus	Arctic staghorn sculpin	Kelp snailfish
Adolf's eelpout	64.5	1.5	0.9	0.3	0.2	3.8	1.0	2.5	12.8	2.2	1.5	8.6
Arctic alligatorfish	0.8	80.5	4.2	0	0.1	4.8	2.3	0.1	2.2	0.7	4.5	0.1
Canadian eelpout	2.6	1.6	86.8	0.2	0.3	1.0	1.9	0	3.9	0.8	0.7	0.1
Capelin	0	0	0.9	84.1	8.4	0	2	3.1	0	0.1	0	1.3
Arctic cod	0	0.7	3.1	11.8	70.4	0.8	2.1	4.2	0.2	0	0.3	6.4
Decapod	0.3	4.2	0.7	1.7	0.4	83.6	2.3	0.1	4.7	1.3	0.5	0.4
Stout eelblenny	4.6	2.2	2.3	0.4	0.6	2.8	79.2	0.5	1.6	1	4.1	0.7
Greenland halibut	0.6	0.6	0.9	2.5	4.2	0.6	0.9	81.3	0.2	1	0.4	6.7
Isopod	0.7	9.4	9.0	1	0.3	12.8	1.3	0	65.1	0.3	0	0.1
Octopus	4.8	9.7	0	3.8	8.9	5.9	0	6.8	3.2	54.6	2.1	0.2
Arctic staghorn sculpin	20.3	1.6	28.4	0	0.4	6.4	2	0.2	5.7	1.1	30.9	1.9
Kelp snailfish	3	0.4	1.3	0.4	3.8	2.1	5.1	2.1	0	0.5	0	81.3



**Table S5.** The individual QFASAR (quantitative fatty acid signatures analysis in R) prey proportions for 178 adult Beaufort Sea beluga whales from 2011 to 2014 using 25 fatty acid signatures (ADEL= Adolf's eelpout, ALLF= Arctic alligatorfish, ARCD= Arctic cod, ASSC= Arctic staghorn sculpin, CAEL= Canadian eelpout, CAPE= Capelin, DECA= Decapods, EELB= Stout eelblenny, GLHB=Greenland halibut, ISOD= Isopod, OCTO= Octopus, SNLF= Kelp snailfish.

Sample ID	Size	Year	ADEL	ALLF	ARCD	ASSC	CAEL	CAPE	DECA	EELB	GLHB	ISOD	OCTO	SNLF
EWF-13-11 I	Large	2013	0.00	0.00	0.86	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.01
EWF-13-12 I	Medium	2013	0.00	0.00	0.77	0.00	0.13	0.10	0.00	0.00	0.00	0.00	0.00	0.00
EWF-13-13 I	Medium	2013	0.00	0.00	0.14	0.00	0.21	0.55	0.00	0.00	0.05	0.00	0.01	0.04
EWF-13-14 I	Medium	2013	0.00	0.00	0.54	0.00	0.19	0.27	0.00	0.00	0.00	0.00	0.00	0.00
EWF-13-15 I	Medium	2013	0.00	0.00	0.20	0.00	0.24	0.54	0.00	0.00	0.00	0.00	0.00	0.02
HI-11-01 I	Large	2011	0.00	0.00	0.91	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00
HI-11-02 I	Large	2011	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.27	0.05	0.00	0.00
HI-11-03 I	Large	2011	0.00	0.00	0.83	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-04 I	Large	2011	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00
HI-11-05 I	Medium	2011	0.00	0.00	0.87	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-06 I	Small	2011	0.00	0.00	0.77	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-07 I	Medium	2011	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00
HI-11-08 I	Medium	2011	0.00	0.00	0.57	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.07
HI-11-09 I	Female	2011	0.00	0.00	0.86	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.01	0.00
HI-11-10 I	Medium	2011	0.00	0.00	0.61	0.00	0.27	0.05	0.00	0.00	0.00	0.00	0.00	0.07
HI-11-11 I	Medium	2011	0.00	0.00	0.64	0.00	0.17	0.15	0.00	0.00	0.00	0.00	0.00	0.04
HI-11-12 I	Medium	2011	0.00	0.00	0.96	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00
HI-11-13 I	Small	2011	0.00	0.00	0.65	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-14 I	Large	2011	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-15 I	Medium	2011	0.00	0.00	0.95	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-11-16 I	Medium	2011	0.00	0.00	0.77	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.01
HI-11-17 I	Medium	2011	0.00	0.00	0.77	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.02
HI-11-18 I	Large	2011	0.00	0.00	0.89	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-12-01 I	Medium	2012	0.00	0.00	0.94	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
HI-12-02 I	Large	2012	0.00	0.00	0.14	0.00	0.28	0.41	0.00	0.00	0.00	0.00	0.00	0.18
HI-12-03 I	Small	2012	0.00	0.00	0.93	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00
HI-12-04 I	Medium	2012	0.00	0.00	0.02	0.00	0.18	0.70	0.00	0.00	0.00	0.00	0.00	0.10

HI-12-05 I	Large	2012	0.00	0.00	0.48	0.00	0.18	0.27	0.00	0.00	0.00	0.00	0.00	0.07
HI-12-06 I	Small	2012	0.00	0.00	0.84	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-12-07 I	Medium	2012	0.00	0.00	0.56	0.00	0.12	0.21	0.00	0.00	0.05	0.00	0.00	0.06
HI-12-08 I	Female	2012	0.00	0.00	0.00	0.00	0.52	0.40	0.00	0.08	0.00	0.00	0.00	0.00
HI-12-09 I	Female	2012	0.00	0.00	0.43	0.00	0.37	0.20	0.00	0.00	0.00	0.00	0.00	0.00
HI-12-10 I	Medium	2012	0.00	0.00	0.90	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-12-11 I	Female	2012	0.00	0.00	0.86	0.00	0.03	0.06	0.02	0.00	0.02	0.00	0.00	0.00
HI-12-12 I	Medium	2012	0.00	0.00	0.10	0.00	0.27	0.48	0.00	0.00	0.00	0.00	0.00	0.15
HI-12-13 I	Medium	2012	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
HI-12-14 I	Large	2012	0.00	0.00	0.98	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
HI-12-15 I	Medium	2012	0.00	0.00	0.85	0.00	0.10	0.04	0.01	0.00	0.00	0.00	0.00	0.00
HI-12-16 I	Medium	2012	0.00	0.00	0.53	0.00	0.14	0.23	0.00	0.00	0.00	0.00	0.00	0.10
HI-12-17 I	Medium	2012	0.00	0.00	0.20	0.00	0.20	0.56	0.00	0.00	0.00	0.00	0.00	0.04
HI-12-18 I	Female	2012	0.00	0.00	0.59	0.00	0.07	0.30	0.03	0.00	0.00	0.00	0.00	0.00
HI-12-19 I	Medium	2012	0.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-12-20 I	Large	2012	0.00	0.00	0.65	0.00	0.10	0.09	0.00	0.00	0.13	0.00	0.00	0.03
HI-12-21 I	Medium	2012	0.00	0.00	0.96	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00
HI-12-22 I	Medium	2012	0.00	0.00	0.00	0.00	0.26	0.58	0.00	0.00	0.00	0.00	0.00	0.16
HI-12-23 I	Medium	2012	0.00	0.00	0.85	0.00	0.09	0.02	0.03	0.00	0.00	0.00	0.01	0.00
HI-12-24 I	Medium	2012	0.00	0.00	0.90	0.00	0.07	0.00	0.04	0.00	0.00	0.00	0.00	0.00
HI-12-25 I	Medium	2012	0.00	0.00	0.94	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00
HI-12-26 I	Medium	2012	0.00	0.00	0.76	0.00	0.03	0.18	0.02	0.00	0.00	0.00	0.00	0.01
HI-12-27 I	Medium	2012	0.00	0.00	0.96	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
HI-12-28 I	Large	2012	0.00	0.00	0.21	0.00	0.21	0.52	0.00	0.00	0.00	0.00	0.00	0.06
HI-12-29 I	Large	2012	0.00	0.00	0.17	0.00	0.18	0.32	0.00	0.00	0.33	0.00	0.00	0.00
HI-13-01 I	Female	2013	0.00	0.00	0.75	0.00	0.01	0.17	0.02	0.00	0.03	0.02	0.00	0.00
HI-13-02 I	Female	2013	0.00	0.00	0.46	0.00	0.17	0.37	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-03 I	Large	2013	0.00	0.00	0.85	0.00	0.06	0.06	0.03	0.00	0.00	0.00	0.00	0.00
HI-13-04 I	Female	2013	0.00	0.00	0.39	0.00	0.44	0.18	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-05 I	Medium	2013	0.00	0.00	0.83	0.00	0.00	0.01	0.01	0.00	0.12	0.02	0.01	0.00
HI-13-06 I	Medium	2013	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HI-13-07 I	Large	2013	0.00	0.00	0.73	0.00	0.04	0.03	0.02	0.00	0.14	0.04	0.00	0.00
HI-13-08 I	Large	2013	0.00	0.00	0.84	0.00	0.00	0.00	0.06	0.00	0.09	0.00	0.01	0.00
HI-13-09 I	Medium	2013	0.00	0.00	0.81	0.00	0.00	0.02	0.02	0.00	0.12	0.01	0.02	0.00
HI-13-10 I	Medium	2013	0.00	0.00	0.84	0.00	0.00	0.10	0.06	0.00	0.00	0.00	0.00	0.00
HI-13-11 I	Medium	2013	0.00	0.00	0.58	0.00	0.01	0.12	0.00	0.00	0.28	0.02	0.00	0.00
HI-13-12 I	Large	2013	0.00	0.00	0.75	0.00	0.01	0.06	0.00	0.00	0.15	0.03	0.00	0.00
HI-13-13 I	Medium	2013	0.00	0.00	0.71	0.00	0.09	0.20	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-14 I	Medium	2013	0.00	0.00	0.30	0.00	0.29	0.40	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-15 I	Large	2013	0.00	0.00	0.87	0.00	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-16 I	Medium	2013	0.00	0.00	0.77	0.00	0.00	0.00	0.05	0.00	0.15	0.02	0.01	0.00
HI-13-17 I	Large	2013	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-18 I	Medium	2013	0.00	0.00	0.65	0.00	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.02
HI-13-19 I	Medium	2013	0.00	0.00	0.18	0.00	0.22	0.60	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-20 I	Medium	2013	0.00	0.00	0.74	0.00	0.05	0.18	0.02	0.00	0.00	0.00	0.00	0.00
HI-13-21 I	Small	2013	0.00	0.00	0.28	0.00	0.31	0.41	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-22 I	Large	2013	0.00	0.00	0.76	0.00	0.11	0.13	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-23 I	Medium	2013	0.00	0.00	0.75	0.00	0.12	0.14	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-24 I	Large	2013	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HI-13-25 I	Medium	2013	0.00	0.00	0.56	0.00	0.17	0.16	0.00	0.00	0.07	0.00	0.00	0.04
HI-13-26 I	Large	2013	0.00	0.00	0.89	0.00	0.05	0.00	0.01	0.00	0.05	0.00	0.00	0.00
HI-13-27 I	Female	2013	0.00	0.00	0.59	0.00	0.00	0.03	0.03	0.00	0.34	0.00	0.00	0.00
HI-13-28 I	Medium	2013	0.00	0.00	0.90	0.00	0.09	0.00	0.00	0.00	0.00	0.01	0.00	0.00
HI-13-29 I	Medium	2013	0.00	0.00	0.49	0.00	0.17	0.33	0.00	0.00	0.00	0.00	0.00	0.02
HI-13-30 I	Female	2013	0.00	0.00	0.71	0.00	0.09	0.20	0.00	0.00	0.00	0.00	0.00	0.00
KI-12-01 I	Female	2012	0.00	0.00	0.36	0.00	0.05	0.49	0.06	0.02	0.00	0.00	0.00	0.01
KI-12-02 I	Large	2012	0.00	0.00	0.91	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.02	0.00
KI-12-03 I	Female	2012	0.00	0.00	0.84	0.00	0.05	0.07	0.05	0.00	0.00	0.00	0.00	0.00
KI-12-04 I	Female	2012	0.00	0.00	0.09	0.00	0.29	0.62	0.00	0.00	0.00	0.00	0.00	0.00
KI-12-05 I	Medium	2012	0.00	0.00	0.76	0.00	0.10	0.14	0.00	0.00	0.00	0.00	0.00	0.00
KI-12-09 I	Large	2012	0.00	0.00	0.95	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00
KI-12-10 I	Large	2012	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00

KI-12-11 I	Female	2012	0.00	0.00	0.83	0.00	0.00	0.07	0.09	0.00	0.00	0.00	0.01	0.00
KI-12-12 I	Large	2012	0.00	0.00	0.17	0.00	0.17	0.00	0.07	0.00	0.51	0.04	0.00	0.04
KI-12-13 I	Medium	2012	0.00	0.00	0.90	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00
KI-12-14 I	Medium	2012	0.00	0.00	0.72	0.00	0.06	0.12	0.00	0.00	0.11	0.00	0.00	0.00
KI-12-15 I	Medium	2012	0.00	0.00	0.26	0.00	0.10	0.55	0.00	0.00	0.00	0.00	0.00	0.09
KI-12-16 I	Large	2012	0.00	0.00	0.79	0.00	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.12
KI-13-02 I	Large	2013	0.00	0.00	0.84	0.00	0.01	0.10	0.05	0.00	0.00	0.00	0.00	0.00
KI-13-03 I	Large	2013	0.00	0.00	0.35	0.00	0.17	0.19	0.06	0.00	0.23	0.00	0.00	0.00
KI-13-04 I	Female	2013	0.00	0.00	0.04	0.00	0.32	0.60	0.00	0.04	0.00	0.00	0.00	0.00
KI-13-05 I	Female	2013	0.00	0.00	0.40	0.00	0.22	0.35	0.03	0.00	0.00	0.00	0.00	0.00
KI-13-06 I	Medium	2013	0.00	0.00	0.55	0.00	0.28	0.18	0.00	0.00	0.00	0.00	0.00	0.00
KI-13-07 I	Large	2013	0.00	0.00	0.70	0.00	0.00	0.00	0.03	0.00	0.27	0.00	0.00	0.00
KI-13-08 I	Female	2013	0.00	0.00	0.09	0.00	0.36	0.54	0.00	0.00	0.00	0.00	0.00	0.00
KI-13-10 I	Large	2013	0.00	0.00	0.75	0.00	0.13	0.12	0.00	0.00	0.00	0.00	0.00	0.00
KI-13-11 I	Large	2013	0.00	0.00	0.90	0.00	0.03	0.00	0.00	0.00	0.06	0.00	0.01	0.00
KI-13-13 I	Female	2013	0.00	0.00	0.06	0.00	0.42	0.52	0.00	0.00	0.00	0.00	0.00	0.00
PA-11-01 I	Large	2011	0.00	0.00	0.68	0.00	0.23	0.03	0.00	0.00	0.00	0.00	0.00	0.05
PA-11-02 I	Small	2011	0.00	0.00	0.44	0.00	0.32	0.19	0.00	0.00	0.00	0.00	0.00	0.05
PA-11-03 I	Small	2011	0.00	0.00	0.34	0.00	0.40	0.20	0.00	0.00	0.00	0.00	0.00	0.06
PA-11-04 I	Small	2011	0.00	0.00	0.73	0.00	0.26	0.00	0.01	0.00	0.00	0.00	0.00	0.00
PA-11-05 I	Medium	2011	0.00	0.00	0.53	0.00	0.32	0.13	0.00	0.00	0.00	0.00	0.00	0.02
PA-11-06 I	Medium	2011	0.00	0.00	0.80	0.00	0.13	0.00	0.02	0.00	0.00	0.00	0.00	0.05
PA-12-01 I	Large	2012	0.00	0.00	0.90	0.00	0.02	0.01	0.07	0.00	0.00	0.00	0.00	0.00
PA-12-02 I	Large	2012	0.00	0.00	0.88	0.00	0.05	0.03	0.03	0.00	0.00	0.00	0.00	0.00
PA-12-03 I	Large	2012	0.00	0.00	0.90	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
PA-12-27 I	Small	2012	0.00	0.00	0.16	0.00	0.25	0.47	0.00	0.00	0.00	0.00	0.00	0.11
PA-12-29 I	Medium	2012	0.00	0.00	0.22	0.00	0.12	0.55	0.00	0.00	0.00	0.00	0.00	0.11
PA-13-04 I	Large	2013	0.00	0.00	0.67	0.00	0.00	0.00	0.08	0.00	0.24	0.00	0.00	0.01
PA-13-05 I	Medium	2013	0.00	0.00	0.67	0.00	0.00	0.00	0.09	0.00	0.20	0.01	0.00	0.02
PA-13-06 I	Large	2013	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.12	0.06	0.00	0.02
PA-13-07 I	Medium	2013	0.00	0.00	0.72	0.00	0.00	0.00	0.12	0.00	0.16	0.00	0.00	0.00

PA-13-09 I	Large	2013	0.00	0.00	0.73	0.00	0.00	0.00	0.03	0.00	0.21	0.04	0.00	0.00
PA-13-11 I	Large	2013	0.00	0.00	0.72	0.00	0.00	0.00	0.04	0.00	0.22	0.01	0.00	0.00
PA-13-27 I	Small	2013	0.00	0.00	0.88	0.00	0.01	0.04	0.05	0.00	0.00	0.00	0.02	0.00
arewf-14-01	Large	2014	0.00	0.00	0.00	0.00	0.37	0.49	0.00	0.00	0.00	0.00	0.00	0.14
arewf-14-02	Medium	2014	0.00	0.00	0.00	0.00	0.24	0.63	0.00	0.00	0.00	0.00	0.00	0.13
arewf-14-03	Large	2014	0.00	0.00	0.48	0.00	0.11	0.33	0.00	0.00	0.07	0.00	0.00	0.01
arewf-14-04	Large	2014	0.00	0.00	0.91	0.00	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00
arewf-14-05	Small	2014	0.00	0.00	0.00	0.00	0.26	0.72	0.00	0.00	0.00	0.00	0.00	0.01
arewf-14-06	Large	2014	0.00	0.00	0.87	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.08
arewf-14-07	Female	2014	0.00	0.00	0.00	0.00	0.37	0.58	0.00	0.00	0.00	0.00	0.00	0.05
arewf-14-08	Large	2014	0.00	0.00	0.79	0.00	0.07	0.14	0.00	0.00	0.00	0.00	0.00	0.00
arewf-14-09	Large	2014	0.00	0.00	0.70	0.00	0.08	0.18	0.03	0.00	0.00	0.00	0.00	0.00
arewf-14-10	Medium	2014	0.00	0.00	0.33	0.00	0.13	0.49	0.00	0.00	0.00	0.00	0.00	0.05
arewf-14-11	Large	2014	0.00	0.00	0.31	0.00	0.23	0.35	0.00	0.00	0.00	0.00	0.00	0.12
arewf-14-12	Large	2014	0.00	0.00	0.10	0.00	0.38	0.39	0.00	0.00	0.00	0.00	0.00	0.14
arewf-14-13	Large	2014	0.00	0.00	0.76	0.00	0.09	0.16	0.00	0.00	0.00	0.00	0.00	0.00
arewf-14-14	Female	2014	0.00	0.00	0.33	0.00	0.17	0.43	0.00	0.00	0.00	0.00	0.00	0.07
arewf-14-15	Large	2014	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.30	0.02	0.01	0.01
arewf-14-16	Large	2014	0.00	0.00	0.86	0.00	0.02	0.12	0.00	0.00	0.00	0.00	0.00	0.00
arewf-14-17	Medium	2014	0.00	0.00	0.18	0.00	0.14	0.61	0.00	0.00	0.00	0.00	0.00	0.07
arhi-14-01	Large	2014	0.00	0.00	0.13	0.00	0.22	0.36	0.00	0.00	0.30	0.00	0.00	0.00
arhi-14-10	Medium	2014	0.00	0.00	0.39	0.00	0.13	0.45	0.00	0.00	0.00	0.00	0.00	0.03
arhi-14-02	Large	2014	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-03	Medium	2014	0.00	0.00	0.48	0.00	0.12	0.30	0.00	0.00	0.10	0.00	0.00	0.00
arhi-14-04	Medium	2014	0.00	0.00	0.80	0.00	0.08	0.12	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-05	Large	2014	0.00	0.00	0.89	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.03
arhi-14-06	Medium	2014	0.00	0.00	0.95	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-07	Female	2014	0.00	0.00	0.46	0.00	0.20	0.34	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-08	Small	2014	0.00	0.00	0.00	0.00	0.34	0.66	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-09	Large	2014	0.00	0.00	0.95	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.01	0.00
arhi-14-11	Small	2014	0.00	0.00	0.78	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00

arhi-14-12	Medium	2014	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-13	Small	2014	0.00	0.00	0.50	0.00	0.11	0.36	0.00	0.00	0.00	0.00	0.00	0.02
arhi-14-14	Female	2014	0.00	0.00	0.33	0.00	0.34	0.30	0.00	0.00	0.00	0.00	0.00	0.03
arhi-14-15	Large	2014	0.00	0.00	0.89	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arhi-14-16	Medium	2014	0.00	0.00	0.45	0.00	0.10	0.33	0.00	0.00	0.00	0.00	0.00	0.12
arhi-14-17	Female	2014	0.00	0.00	0.03	0.00	0.41	0.50	0.00	0.00	0.00	0.00	0.00	0.06
arhi-14-18	Medium	2014	0.00	0.00	0.50	0.00	0.22	0.23	0.00	0.00	0.00	0.00	0.00	0.05
arhi-14-19	Medium	2014	0.00	0.00	0.95	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00
arhi-14-20	Medium	2014	0.00	0.00	0.65	0.00	0.17	0.06	0.00	0.00	0.02	0.00	0.00	0.10
arki-14-08	Large	2014	0.00	0.00	0.17	0.00	0.11	0.24	0.02	0.00	0.46	0.00	0.00	0.00
arki-14-16	Female	2014	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00
arki-14-19	Female	2014	0.00	0.00	0.00	0.00	0.28	0.71	0.00	0.00	0.00	0.00	0.00	0.01
arpa-14-02	Large	2014	0.00	0.00	0.87	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00
arpa-14-05	Female	2014	0.00	0.00	0.00	0.00	0.33	0.42	0.00	0.00	0.19	0.00	0.00	0.06
arpa-14-15	Large	2014	0.00	0.00	0.91	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arpa-14-23	Small	2014	0.00	0.00	0.20	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00
arpa-14-25	Small	2014	0.00	0.00	0.01	0.00	0.41	0.49	0.00	0.00	0.00	0.00	0.00	0.09
arew-dl-13-01	Medium	2013	0.00	0.00	0.00	0.00	0.38	0.10	0.00	0.00	0.52	0.00	0.00	0.00
arew-dl-13-02	Small	2013	0.00	0.00	0.00	0.00	0.53	0.31	0.00	0.09	0.00	0.00	0.00	0.07
arew-dl-13-03	Small	2013	0.00	0.00	0.00	0.00	0.51	0.42	0.00	0.00	0.00	0.00	0.00	0.07
arew-dl-13-04	Medium	2013	0.00	0.00	0.19	0.00	0.25	0.50	0.00	0.00	0.00	0.00	0.00	0.06
arew-dl-13-05	Large	2013	0.00	0.00	0.52	0.00	0.13	0.27	0.00	0.00	0.00	0.00	0.01	0.07
arew-dl-13-06	Medium	2013	0.00	0.00	0.94	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00
arew-dl-13-07	Large	2013	0.00	0.00	0.94	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arew-dl-13-08	Small	2013	0.00	0.00	0.52	0.00	0.17	0.31	0.00	0.00	0.00	0.00	0.00	0.00
arew-dl-13-09	Large	2013	0.00	0.00	0.91	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
arew-dl-13-10	Medium	2013	0.00	0.00	0.13	0.00	0.32	0.42	0.00	0.00	0.00	0.00	0.00	0.13

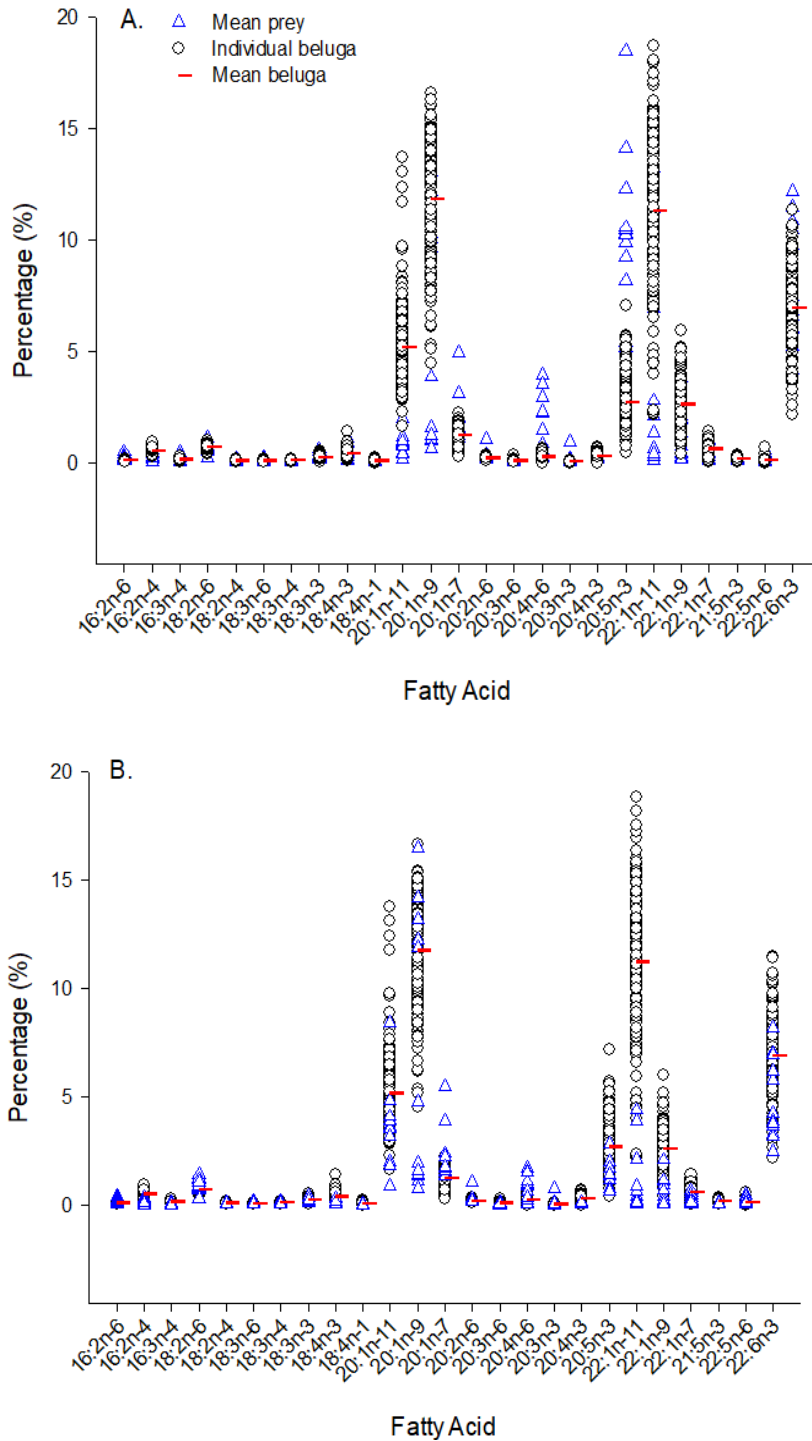
Table S6. Mean Aitchison distance measures for each of the 25 fatty acid signatures used in our QFASAR (quantitative fatty acid signatures analysis in R) diet estimates for 178 individual beluga whales.

Fatty acid	Distance
16:2n-6	0.02
16:2n-4	0.02
16:3n-4	0.03
18:2n-6	0.03
18:2n-4	0.03
18:3n-6	0.04
18:3n-4	0.00
18:3n-3	0.01
18:4n-3	0.02
18:4n-1	0.03
20:1n-11	0.01
20:1n-9	0.02
20:1n-7	0.22
20:2n-6	0.00
20:3n-6	0.07
20:4n-6	0.02
20:3n-3	0.02
20:4n-3	0.04
20:5n-3	0.04
22:1n-11	0.15
22:1n-9	0.02
22:1n-7	0.02
21:5n-3	0.05
22:5n-6	0.03
22:6n-3	0.02

**Table S7.** Percentages (%) of prey species from diet proportions contributing to over 80% of the dissimilarities between year and size and sex classes of Beaufort Sea beluga whales produced by similarity percentages routine analysis (SIMPER).

Group 1	Group 2	Arctic cod	Capelin	Canadian eelpout	Total
Female	Large	57.53	25.14		82.67
Female	Medium	58.51	26.3		84.81
Large	Medium	57.54	25.42		82.96
Female	Small	55.34	28.23		83.57
Large	Small	55.48	26.44		81.92
Medium	Small	56.44	28.93		85.37
2011	2012	54.52	27.14		81.66
2011	2013	52.27	23.62	14.53	90.42
2012	2013	58.06	24.86		82.92
2011	2014	55.15	31.47		86.62
2012	2014	60.47	26.68		87.15
2013	2014	57.16	26.63		83.79





**Figure S1.** (A) Overlap of individual and mean beluga whale fatty acid (FA) signatures ( $n = 178$ ) with mean prey signatures ( $n = 12$ ) vs. (B) the overlap of beluga FAs and prey signatures scaled and transformed to the predator FA optimization space using the calibration coefficients.