

Prevailing weather conditions and diet composition affect chick growth and survival in the black-legged kittiwake

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Table S1. Seasonal and annual differences in the occurrence of the different prey types of black-legged kittiwakes at Anda, Norway (2007-2016). N = number of regurgitates. Full species names, with scientific names, are given in the main manuscript.

5-day period	Year	N	Prey Species								
			Sandeel	Glacier lanternf.	Silvery lightfish	Spotted barr.	Gadids	Herring	Offal	Crust.	Unident.
21. - 25.06	2007	11	0.17	-	-	-	0.47	0.27	0.01	-	-
26. - 30.06	2007	7	0.80	-	-	-	0.03	0.04	-	-	0.14
01. - 05.07	2007	11	0.29	-	-	-	0.62	0.08	-	-	-
06. - 10.07	2007	15	0.31	-	-	-	0.47	0.21	-	-	-
11. - 15.07	2007	11	0.20	-	-	-	0.38	0.42	-	-	-
19. - 20.07	2007	7	0.38	-	-	-	0.57	0.05	-	-	-
21. - 25.06	2008	11	0.37	0.22	-	-	0.09	0.17	-	0.05	0.09
26. - 30.06	2008	11	0.09	0.31	-	-	0.09	0.05	0.09	0.14	0.19
01. - 05.07	2008	10	0.69	0.11	-	-	0.10	0.08	-	0.02	-
06. - 10.07	2008	13	0.38	0.35	-	-	-	0.09	0.15	0.02	0.01
11. - 15.07	2008	11	0.51	0.07	-	-	-	0.32	0.09	0.01	-
19. - 20.07	2008	11	0.32	0.22	-	-	0.11	0.18	-	0.15	0.02
21. - 25.06	2009	10	0.70	0.19	0.10	-	-	-	-	0.01	-
26. - 30.06	2009	11	0.81	0.17	-	-	-	-	-	0.01	-
01. - 05.07	2009	11	0.49	0.18	0.05	-	-	0.11	0.09	0.07	-
06. - 10.07	2009	14	0.55	0.19	0.01	-	0.01	0.07	0.12	0.05	-
11. - 15.07	2009	19	0.68	0.09	0.11	-	-	0.08	-	0.01	0.02
21. - 25.06	2010	11	0.44	0.06	0.20	-	-	0.13	0.13	0.03	0.02
26. - 30.06	2010	12	0.50	0.05	0.14	-	-	0.18	0.09	0.02	0.02
01. - 05.07	2010	11	0.50	0.34	-	-	0.05	0.09	-	0.01	0.01
06. - 10.07	2010	8	0.61	0.21	0.03	-	-	0.13	-	-	0.03
11. - 15.07	2010	8	0.38	0.05	0.05	-	0.13	0.38	-	0.03	-
19. - 20.07	2011	4	0.25	-	-	-	0.46	0.11	0.18	-	-
21. - 25.06	2011	7	0.41	0.29	0.04	-	0.14	-	-	0.08	0.04
26. - 30.06	2011	6	0.33	0.25	-	-	0.17	-	0.17	-	0.08
01. - 05.07	2011	10	0.60	-	0.10	-	0.10	-	0.05	0.05	0.10
06. - 10.07	2011	8	0.75	0.13	-	-	-	0.06	-	0.06	-
11. - 15.07	2011	6	0.83	-	-	-	-	0.17	-	-	-
21. - 25.06	2012	10	-	0.76	0.01	0.01	-	0.11	0.05	0.03	0.05
26. - 30.06	2012	13	0.12	0.54	0.01	0.04	0.10	0.08	-	0.05	0.07
01. - 05.07	2012	12	0.08	0.53	0.01	0.10	0.08	-	-	0.11	0.08
06. - 10.07	2012	12	0.17	0.49	-	0.03	0.01	0.08	-	0.22	-
11. - 15.07	2012	7	0.33	0.04	-	0.04	0.14	0.03	-	0.39	0.03
19. - 20.07	2012	5	-	0.22	-	0.06	-	0.38	-	0.12	0.22
21. - 25.06	2013	12	0.33	0.34	0.04	0.04	-	0.05	0.08	0.02	0.09

5-day period	Year	N	Prey Species								
			Sandeel	Glacier lanternf.	Silvery lightfish	Spotted barr.	Gadids	Herring	Offal	Crust.	Unident.
26. - 30.06	2013	9	0.56	0.30	-	0.01	0.11	-	-	0.01	0.01
01. - 05.07	2013	33	0.64	0.20	-	0.02	0.07	0.05	0.01	0.01	-
06. - 10.07	2013	12	0.45	0.17	-	0.06	0.08	0.21	-	0.02	-
11. - 15.07	2013	20	0.35	0.13	0.02	0.04	0.10	0.23	0.05	0.03	0.05
19. - 20.07	2013	15	0.49	0.04	-	0.02	0.16	0.09	0.10	0.10	-
26. - 30.06	2014	10	0.40	0.29	0.08	0.01	0.10	0.10	-	0.03	-
01. - 05.07	2014	23	0.39	0.11	-	-	0.1	0.30	0.02	-	0.09
06. - 10.07	2014	20	0.45	0.16	-	0.05	0.23	0.03	-	0.07	0.03
11. - 15.07	2014	21	0.61	-	-	-	0.14	0.20	0.05	-	-
19. - 20.07	2014	10	0.27	0.24	-	0.08	0.27	0.11	0.03	0.01	-
15. - 20.06	2015	4	0.25	0.33	0.05	0.25	-	0.13	-	-	-
21. - 25.06	2015	10	0.19	0.43	0.01	0.14	-	0.05	0.08	-	0.10
26. - 30.06	2015	15	0.46	0.14	-	-	0.07	0.07	-	0.20	0.07
01. - 05.07	2015	10	0.45	0.31	-	-	-	0.15	-	0.09	-
06. - 10.07	2015	25	0.89	-	-	-	0.11	-	-	-	-
11. - 15.07	2015	20	0.95	-	-	-	0.05	0.01	-	-	-
19. - 20.07	2015	12	0.55	0.04	-	-	0.17	0.13	0.02	0.09	-
15. - 20.06	2016	10	0.13	0.13	-	-	0.30	0.33	-	0.10	-
21. - 25.06	2016	14	0.47	0.04	-	-	0.15	0.31	-	0.04	-
26. - 30.06	2016	13	0.48	-	-	-	0.20	0.16	0.08	-	0.08
01. - 05.07	2016	15	0.78	-	-	-	0.11	0.10	-	-	-
06. - 10.07	2016	16	0.38	-	-	-	0.60	0.02	-	-	-
16. - 20.07	2016	20	0.41	0.03	-	-	0.43	0.05	0.05	0.03	0.01

Table S2. Model selection results for growth of kittiwake chicks, presented as respectively groupings in hypothesis and when comparing all models. The models with the lowest ΔAICc and highest AICc weight in each group are shown in bold. rcs = restricted cubic spline (see growth analysis in the methods chapter).

model	Hypothesis	d.f.	Hypothesis groupings			all models together	
			AICc	ΔAICc	AICc wt	ΔAICc	AICc wt
1		3	8448.52			770.2	0.00
rcs(age.3)		7	7910.01			231.7	0.00
rcs(age.3)+no. of chicks	H1	8	7711.9	0.0	0.55	33.6	0.00
rcs(age.3)+hatching order	H1	9	7714.4	2.5	0.16	36.1	0.00
rcs(age.3)+sibling status	H1	11	7713.1	1.3	0.29	34.9	0.00
rcs(age.3)+sandeel diet	H2	8	7689.0	0.0	1.00	10.6	0.00
rcs(age.3)+mesopelagic diet	H2	8	7712.1	23.2	0.00	33.8	0.00
rcs(age.3)+herring diet	H2	8	7717.2	28.2	0.00	38.8	0.00
rcs(age.3)+ gadid diet	H2	8	7717.7	28.7	0.00	39.4	0.00
rcs(age.3)+sandeel diet*hatching order	H1, H2	12	7679.5	0.0	0.78	1.1	0.33
rcs(age.3)+sandeel diet*no. of chicks	H1, H2	10	7682.0	2.5	0.22	3.7	0.09
rcs(age.3)+mesopelagic diet*hatching order	H1, H2	12	7697.0	17.5	0.00	18.7	0.00
rcs(age.3)+mesopelagic diet*no. of chicks	H1, H2	10	7707.8	28.3	0.00	29.4	0.00
rcs(age.3)+herring diet*no. of chicks	H1, H2	10	7710.2	30.8	0.00	31.9	0.00
rcs(age.3)+gadid diet*no. of chicks	H1, H2	10	7711.2	31.7	0.00	32.8	0.00
rcs(age.3)+herring diet*hatching order	H1, H2	12	7713.4	33.9	0.00	35.0	0.00
rcs(age.3)+gadid diet*hatching order	H1, H2	12	7713.6	34.2	0.00	35.3	0.00
rcs(age.3)+chill	H3	8	7692.9	0.0	0.85	14.6	0.00
rcs(age.3)+ wind direction*chill	H3	14	7696.5	3.6	0.14	18.1	0.00
rcs(age.3)+ wind direction*wind speed	H3	14	7704.3	11.3	0.00	25.9	0.00
rcs(age.3)+ wind direction	H3	10	7713.0	20.1	0.00	34.7	0.00
rcs(age.3)+wind speed	H3	8	7715.7	22.8	0.00	37.4	0.00
rcs(age.3)+precipitation	H3	8	7718.0	25.1	0.00	39.7	0.00
rcs(age.3)+sandeel diet *wind speed	H2, H3	10	7678.3	0.0	0.99	0.0	0.57
rcs(age.3)+sandeel diet*wind direction	H2, H3	14	7687.2	8.8	0.01	8.8	0.00
rcs(age.3)+mesopelagic diet*wind speed	H2, H3	10	7700.1	21.8	0.00	21.8	0.01
rcs(age.3)+mesopelagic diet*wind direction	H2, H3	14	7704.5	26.2	0.00	26.2	0.00

Table S3. Model selection results for survival of kittiwake chicks. presented as respectively groupings in hypothesis and when comparing all models. The models with the lowest $\Delta AICc$ and highest AICc weight in each group are shown in bold.

	Hypothesis	K	AICc	Hypothesis groupings		All models together	
				$\Delta AICc$	AICc wt	$\Delta AICc$	AICc wt
0-model			1730.4				
Hatching order	H1	2	1724.0	0.0	0.65	23.3	0.00
Sibling status	H1	4	1725.4	1.4	0.32	24.6	0.00
No. chicks	H1	1	1734.4	10.4	0.00	33.6	0.00
Mesopelagic diet	H2	1	1708.4	0.0	0.92	7.6	0.01
Gadid diet	H2	1	1713.3	5.0	0.08	12.6	0.00
Sandeel diet	H2	1	1722.8	14.4	0.00	22.0	0.00
Herring diet	H2	1	1731.6	23.2	0.00	30.8	0.00
Mesopelagic diet*hatching order	H1, H2	5	1704.9	0.0	0.92	4.1	0.07
Gadid diet*hatching order	H1, H2	5	1709.9	5.0	0.08	9.1	0.01
Sandeel diet*hatching order	H1, H2	5	1721.9	17.1	0.00	21.1	0.00
prop_herringZ*hatching order	H1, H2	5	1730.1	25.2	0.00	29.3	0.00
Wind direction:wind speed	H3	4	1708.8	0.0	0.82	8.1	0.01
Wind direction:precipitation	H3	8	1712.0	3.1	0.17	11.2	0.00
Precipitation	H3	1	1720.5	11.7	0.00	19.7	0.00
Wind speed	H3	1	1723.2	14.4	0.00	22.5	0.00
Wind direction:chill	H3	4	1724.2	15.4	0.00	23.5	0.00
Chill	H3	1	1725.0	16.2	0.00	24.2	0.00
Wind direction	H3	3	1735.7	26.9	0.00	35.0	0.00
Mesopelagic diet*wind speed	H2, H3	3	1700.8	0.0	0.60	0.0	0.54
Mesopelagic diet+wind speed	H2, H3	2	1701.6	0.9	0.39	0.9	0.35
Mesopelagic diet*wind direction	H2, H3	7	1710.05	9.2	0.01	9.2	0.01
Sandeel diet+wind speed	H2, H3	2	1712.6	11.8	0.00	11.8	0.00
Mesopelagic diet+wind direction	H2, H3	4	1713.3	12.6	0.00	12.6	0.00
Sandeel diet*wind speed	H2, H3	3	1714.6	13.8	0.00	13.8	0.00
Sandeel diet*wind direction	H2, H3	7	1715.0	14.2	0.00	14.2	0.00
Sandeel diet+wind direction	H2, H3	4	1728.8	28.0	0.00	28.0	0.00