

## Pathological findings in North Sea and Baltic grey seal and harbour seal intestines associated with acanthocephalan infections

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Table S1. A logistic regression model revealed that the infection probability (with acanthocephalans) of harbour seals from the North Sea depended significantly on host age group and finding year (see table 2 of the main manuscript for the model results). In order to test between which years infection probabilities differed significantly, a posthoc pairwise comparison with Bonferroni correction for the predictor “finding year” (which was coded as a factor variable in the logistic regression analysis) was carried out and is reported in the table below. Prevalence of acanthocephalan infections in the years at the end of our study period (2012–2017) was significantly higher as compared to earlier years (1998–2011). This follows from the fact that the Bonferroni-adjusted p-values for the focal comparisons (marked in bold in the table below) are below the significance threshold (alpha = 0.05). Significance codes: \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, #p<0.1. (Adjusted p-values reported -- Bonferroni method)

Comparison	Estimate	SE	z-value	Adj. p
1999 vs. 1998	0.24976	0.58051	0.430	1.000000
2000 vs. 1998	1.39213	0.57412	2.425	1.000000
2001 vs. 1998	0.15546	0.68068	0.228	1.000000
2002 vs. 1998	1.63684	0.47211	3.467	0.099966 <sup>#</sup>
2003 vs. 1998	1.66720	0.76568	2.177	1.000000
2004 vs. 1998	-0.31458	0.85245	-0.369	1.000000
2005 vs. 1998	1.54675	0.58479	2.645	1.000000
2006 vs. 1998	1.82484	0.68332	2.671	1.000000
2007 vs. 1998	1.18249	0.52470	2.254	1.000000
2008 vs. 1998	1.60670	0.49405	3.252	0.217666
2009 vs. 1998	1.74983	0.46626	3.753	0.033216*
2010 vs. 1998	1.60905	0.51425	3.129	0.333351
2011 vs. 1998	1.69211	0.51182	3.306	0.179759
<b>2012 vs. 1998</b>	<b>3.49186</b>	<b>0.48467</b>	<b>7.205</b>	<b>1.11e-10***</b>
<b>2013 vs. 1998</b>	<b>4.19444</b>	<b>0.49589</b>	<b>8.458</b>	<b>&lt;2e-16***</b>
<b>2014 vs. 1998</b>	<b>3.28941</b>	<b>0.48991</b>	<b>6.714</b>	<b>3.59e-09***</b>
<b>2015 vs. 1998</b>	<b>4.14972</b>	<b>0.49724</b>	<b>8.345</b>	<b>&lt;2e-16***</b>
<b>2016 vs. 1998</b>	<b>4.86748</b>	<b>0.51902</b>	<b>9.378</b>	<b>&lt;2e-16***</b>
<b>2017 vs. 1998</b>	<b>4.39981</b>	<b>0.54611</b>	<b>8.057</b>	<b>1.69e-13***</b>
2000 vs. 1999	1.14237	0.60240	1.896	1.000000
2001 vs. 1999	-0.09430	0.70523	-0.134	1.000000
2002 vs. 1999	1.38708	0.50795	2.731	1.000000
2003 vs. 1999	1.41744	0.78964	1.795	1.000000
2004 vs. 1999	-0.56434	0.87119	-0.648	1.000000
2005 vs. 1999	1.29699	0.61139	2.121	1.000000

Comparison	Estimate	SE	z-value	Adj. p
2006 vs. 1999	1.57508	0.70957	2.220	1.000000
2007 vs. 1999	0.93272	0.55186	1.690	1.000000
2008 vs. 1999	1.35694	0.52616	2.579	1.000000
2009 vs. 1999	1.50006	0.50130	2.992	0.525974
2010 vs. 1999	1.35929	0.54528	2.493	1.000000
2011 vs. 1999	1.44235	0.54357	2.653	1.000000
<b>2012 vs. 1999</b>	<b>3.24210</b>	<b>0.52030</b>	<b>6.231</b>	<b>8.80e-08***</b>
<b>2013 vs. 1999</b>	<b>3.94468</b>	<b>0.53047</b>	<b>7.436</b>	<b>1.97e-11***</b>
<b>2014 vs. 1999</b>	<b>3.03965</b>	<b>0.52354</b>	<b>5.806</b>	<b>1.22e-06***</b>
<b>2015 vs. 1999</b>	<b>3.89996</b>	<b>0.53107</b>	<b>7.344</b>	<b>3.95e-11***</b>
<b>2016 vs. 1999</b>	<b>4.61772</b>	<b>0.55210</b>	<b>8.364</b>	<b>&lt;2e-16***</b>
<b>2017 vs. 1999</b>	<b>4.15005</b>	<b>0.57706</b>	<b>7.192</b>	<b>1.22e-10***</b>
2001 vs. 2000	-1.23667	0.70028	-1.766	1.000000
2002 vs. 2000	0.24471	0.50081	0.489	1.000000
2003 vs. 2000	0.27507	0.78298	0.351	1.000000
2004 vs. 2000	-1.70671	0.86713	-1.968	1.000000
2005 vs. 2000	0.15462	0.60516	0.256	1.000000
2006 vs. 2000	0.43271	0.70235	0.616	1.000000
2007 vs. 2000	-0.20964	0.54569	-0.384	1.000000
2008 vs. 2000	0.21457	0.51627	0.416	1.000000
2009 vs. 2000	0.35770	0.48973	0.730	1.000000
2010 vs. 2000	0.21692	0.53665	0.404	1.000000
2011 vs. 2000	0.29999	0.53248	0.563	1.000000
<b>2012 vs. 2000</b>	<b>2.09973</b>	<b>0.50678</b>	<b>4.143</b>	<b>0.006505**</b>
<b>2013 vs. 2000</b>	<b>2.80231</b>	<b>0.51757</b>	<b>5.414</b>	<b>1.17e-05***</b>
<b>2014 vs. 2000</b>	<b>1.89728</b>	<b>0.51275</b>	<b>3.700</b>	<b>0.040930*</b>
<b>2015 vs. 2000</b>	<b>2.75759</b>	<b>0.51892</b>	<b>5.314</b>	<b>2.04e-05***</b>
<b>2016 vs. 2000</b>	<b>3.47535</b>	<b>0.53964</b>	<b>6.440</b>	<b>2.27e-08***</b>
<b>2017 vs. 2000</b>	<b>3.00768</b>	<b>0.56564</b>	<b>5.317</b>	<b>2.00e-05***</b>
2002 vs. 2001	1.48138	0.61999	2.389	1.000000
2003 vs. 2001	1.51175	0.86511	1.747	1.000000
2004 vs. 2001	-0.47004	0.94187	-0.499	1.000000
2005 vs. 2001	1.39130	0.70867	1.963	1.000000
2006 vs. 2001	1.66939	0.79299	2.105	1.000000
2007 vs. 2001	1.02703	0.65924	1.558	1.000000
2008 vs. 2001	1.45124	0.63604	2.282	1.000000
2009 vs. 2001	1.59437	0.61501	2.592	1.000000
2010 vs. 2001	1.45359	0.65192	2.230	1.000000
2011 vs. 2001	1.53666	0.65009	2.364	1.000000
<b>2012 vs. 2001</b>	<b>3.33641</b>	<b>0.62956</b>	<b>5.300</b>	<b>2.21e-05***</b>
<b>2013 vs. 2001</b>	<b>4.03898</b>	<b>0.63816</b>	<b>6.329</b>	<b>4.69e-08***</b>
<b>2014 vs. 2001</b>	<b>3.13395</b>	<b>0.63319</b>	<b>4.949</b>	<b>0.000141***</b>
<b>2015 vs. 2001</b>	<b>3.99426</b>	<b>0.63903</b>	<b>6.251</b>	<b>7.77e-08***</b>
<b>2016 vs. 2001</b>	<b>4.71202</b>	<b>0.65628</b>	<b>7.180</b>	<b>1.33e-10***</b>
<b>2017 vs. 2001</b>	<b>4.24435</b>	<b>0.67773</b>	<b>6.263</b>	<b>7.20e-08***</b>
2003 vs. 2002	0.03036	0.71256	0.043	1.000000
2004 vs. 2002	-1.95142	0.80487	-2.425	1.000000
2005 vs. 2002	-0.09009	0.51306	-0.176	1.000000
2006 vs. 2002	0.18800	0.62320	0.302	1.000000
2007 vs. 2002	-0.45435	0.44332	-1.025	1.000000
2008 vs. 2002	-0.03014	0.40708	-0.074	1.000000
2009 vs. 2002	0.11299	0.37304	0.303	1.000000
2010 vs. 2002	-0.02779	0.43119	-0.064	1.000000
2011 vs. 2002	0.05527	0.42872	0.129	1.000000
<b>2012 vs. 2002</b>	<b>1.85502</b>	<b>0.39618</b>	<b>4.682</b>	<b>0.000539***</b>
<b>2013 vs. 2002</b>	<b>2.55760</b>	<b>0.40978</b>	<b>6.241</b>	<b>8.24e-08***</b>

Comparison	Estimate	SE	z-value	Adj. p
<b>2014 vs. 2002</b>	<b>1.65257</b>	<b>0.40214</b>	<b>4.109</b>	<b>0.007534**</b>
<b>2015 vs. 2002</b>	<b>2.51288</b>	<b>0.41130</b>	<b>6.110</b>	<b>1.90e-07***</b>
<b>2016 vs. 2002</b>	<b>3.23064</b>	<b>0.43750</b>	<b>7.384</b>	<b>2.91e-11***</b>
<b>2017 vs. 2002</b>	<b>2.76297</b>	<b>0.46925</b>	<b>5.888</b>	<b>7.43e-07***</b>
2004 vs. 2003	-1.98178	1.00554	-1.971	1.000000
2005 vs. 2003	-0.12045	0.79065	-0.152	1.000000
2006 vs. 2003	0.15764	0.86346	0.183	1.000000
2007 vs. 2003	-0.48472	0.74804	-0.648	1.000000
2008 vs. 2003	-0.06050	0.72214	-0.084	1.000000
2009 vs. 2003	0.08262	0.70182	0.118	1.000000
2010 vs. 2003	-0.05815	0.73758	-0.079	1.000000
2011 vs. 2003	0.02491	0.73210	0.034	1.000000
2012 vs. 2003	1.82466	0.71079	2.567	1.000000
2013 vs. 2003	2.52723	0.71899	3.515	0.083565#
2014 vs. 2003	1.62221	0.71822	2.259	1.000000
2015 vs. 2003	2.48252	0.72096	3.443	0.109160
<b>2016 vs. 2003</b>	<b>3.20027</b>	<b>0.73499</b>	<b>4.354</b>	<b>0.002538**</b>
2017 vs. 2003	2.73260	0.75508	3.619	0.056197#
2005 vs. 2004	1.86133	0.87323	2.132	1.000000
2006 vs. 2004	2.13942	0.94400	2.266	1.000000
2007 vs. 2004	1.49707	0.83268	1.798	1.000000
2008 vs. 2004	1.92128	0.81457	2.359	1.000000
2009 vs. 2004	2.06441	0.79830	2.586	1.000000
2010 vs. 2004	1.92363	0.82755	2.324	1.000000
2011 vs. 2004	2.00670	0.82521	2.432	1.000000
<b>2012 vs. 2004</b>	<b>3.80644</b>	<b>0.80939</b>	<b>4.703</b>	<b>0.000487***</b>
<b>2013 vs. 2004</b>	<b>4.50902</b>	<b>0.81611</b>	<b>5.525</b>	<b>6.26e-06***</b>
<b>2014 vs. 2004</b>	<b>3.60399</b>	<b>0.81262</b>	<b>4.435</b>	<b>0.001749**</b>
<b>2015 vs. 2004</b>	<b>4.46430</b>	<b>0.81679</b>	<b>5.466</b>	<b>8.76e-06***</b>
<b>2016 vs. 2004</b>	<b>5.18206</b>	<b>0.83028</b>	<b>6.241</b>	<b>8.24e-08***</b>
<b>2017 vs. 2004</b>	<b>4.71439</b>	<b>0.84727</b>	<b>5.564</b>	<b>5.00e-06***</b>
2006 vs. 2005	0.27809	0.71067	0.391	1.000000
2007 vs. 2005	-0.36427	0.55362	-0.658	1.000000
2008 vs. 2005	0.05995	0.52505	0.114	1.000000
2009 vs. 2005	0.20308	0.49911	0.407	1.000000
2010 vs. 2005	0.06230	0.54567	0.114	1.000000
2011 vs. 2005	0.14536	0.54065	0.269	1.000000
<b>2012 vs. 2005</b>	<b>1.94511</b>	<b>0.51581</b>	<b>3.771</b>	<b>0.030899*</b>
<b>2013 vs. 2005</b>	<b>2.64769</b>	<b>0.52640</b>	<b>5.030</b>	<b>9.33e-05***</b>
2014 vs. 2005	1.74266	0.52199	3.338	0.160045
<b>2015 vs. 2005</b>	<b>2.60297</b>	<b>0.52768</b>	<b>4.933</b>	<b>0.000154***</b>
<b>2016 vs. 2005</b>	<b>3.32072</b>	<b>0.54805</b>	<b>6.059</b>	<b>2.60e-07***</b>
<b>2017 vs. 2005</b>	<b>2.85306</b>	<b>0.57354</b>	<b>4.974</b>	<b>0.000124***</b>
2007 vs. 2006	-0.64236	0.66253	-0.970	1.000000
2008 vs. 2006	-0.21814	0.63373	-0.344	1.000000
2009 vs. 2006	-0.07502	0.61068	-0.123	1.000000
2010 vs. 2006	-0.21579	0.65129	-0.331	1.000000
2011 vs. 2006	-0.13273	0.64519	-0.206	1.000000
2012 vs. 2006	1.66702	0.62130	2.683	1.000000
<b>2013 vs. 2006</b>	<b>2.36959</b>	<b>0.63061</b>	<b>3.758</b>	<b>0.032593*</b>
2014 vs. 2006	1.46457	0.62949	2.327	1.000000
<b>2015 vs. 2006</b>	<b>2.32488</b>	<b>0.63273</b>	<b>3.674</b>	<b>0.045308*</b>
<b>2016 vs. 2006</b>	<b>3.04264</b>	<b>0.64879</b>	<b>4.690</b>	<b>0.000520***</b>
<b>2017 vs. 2006</b>	<b>2.57497</b>	<b>0.67135</b>	<b>3.836</b>	<b>0.023806*</b>
2008 vs. 2007	0.42422	0.45403	0.934	1.000000
2009 vs. 2007	0.56734	0.42463	1.336	1.000000

Comparison	Estimate	SE	z-value	Adj. p
2010 vs. 2007	0.42657	0.47807	0.892	1.000000
2011 vs. 2007	0.50963	0.47228	1.079	1.000000
<b>2012 vs. 2007</b>	<b>2.30938</b>	<b>0.44540</b>	<b>5.185</b>	<b>4.10e-05***</b>
<b>2013 vs. 2007</b>	<b>3.01195</b>	<b>0.45741</b>	<b>6.585</b>	<b>8.65e-09***</b>
<b>2014 vs. 2007</b>	<b>2.10693</b>	<b>0.45156</b>	<b>4.666</b>	<b>0.000584***</b>
<b>2015 vs. 2007</b>	<b>2.96723</b>	<b>0.45840</b>	<b>6.473</b>	<b>1.83e-08***</b>
<b>2016 vs. 2007</b>	<b>3.68499</b>	<b>0.48209</b>	<b>7.644</b>	<b>4.01e-12***</b>
<b>2017 vs. 2007</b>	<b>3.21732</b>	<b>0.51043</b>	<b>6.303</b>	<b>5.54e-08***</b>
2009 vs. 2008	0.14313	0.37550	0.381	1.000000
2010 vs. 2008	0.00235	0.44031	0.005	1.000000
2011 vs. 2008	0.08541	0.42763	0.200	1.000000
<b>2012 vs. 2008</b>	<b>1.88516</b>	<b>0.39195</b>	<b>4.810</b>	<b>0.000287***</b>
<b>2013 vs. 2008</b>	<b>2.58774</b>	<b>0.40657</b>	<b>6.365</b>	<b>3.72e-08***</b>
<b>2014 vs. 2008</b>	<b>1.68271</b>	<b>0.40638</b>	<b>4.141</b>	<b>0.006578**</b>
<b>2015 vs. 2008</b>	<b>2.54302</b>	<b>0.40981</b>	<b>6.205</b>	<b>1.04e-07***</b>
<b>2016 vs. 2008</b>	<b>3.26078</b>	<b>0.43396</b>	<b>7.514</b>	<b>1.09e-11***</b>
<b>2017 vs. 2008</b>	<b>2.79311</b>	<b>0.46667</b>	<b>5.985</b>	<b>4.11e-07***</b>
2010 vs. 2009	-0.14078	0.40748	-0.345	1.000000
2011 vs. 2009	-0.05771	0.39144	-0.147	1.000000
<b>2012 vs. 2009</b>	<b>1.74204</b>	<b>0.34998</b>	<b>4.978</b>	<b>0.000122***</b>
<b>2013 vs. 2009</b>	<b>2.44461</b>	<b>0.36666</b>	<b>6.667</b>	<b>4.95e-09***</b>
<b>2014 vs. 2009</b>	<b>1.53958</b>	<b>0.36875</b>	<b>4.175</b>	<b>0.005657**</b>
<b>2015 vs. 2009</b>	<b>2.39989</b>	<b>0.37101</b>	<b>6.469</b>	<b>1.88e-08***</b>
<b>2016 vs. 2009</b>	<b>3.11765</b>	<b>0.39674</b>	<b>7.858</b>	<b>7.59e-13***</b>
<b>2017 vs. 2009</b>	<b>2.64998</b>	<b>0.43277</b>	<b>6.123</b>	<b>1.74e-07***</b>
2011 vs. 2010	0.08306	0.45667	0.182	1.000000
<b>2012 vs. 2010</b>	<b>1.88281</b>	<b>0.42455</b>	<b>4.435</b>	<b>0.001750**</b>
<b>2013 vs. 2010</b>	<b>2.58539</b>	<b>0.43782</b>	<b>5.905</b>	<b>6.70e-07***</b>
<b>2014 vs. 2010</b>	<b>1.68036</b>	<b>0.43567</b>	<b>3.857</b>	<b>0.021815*</b>
<b>2015 vs. 2010</b>	<b>2.54067</b>	<b>0.44032</b>	<b>5.770</b>	<b>1.51e-06***</b>
<b>2016 vs. 2010</b>	<b>3.25843</b>	<b>0.46349</b>	<b>7.030</b>	<b>3.92e-10***</b>
<b>2017 vs. 2010</b>	<b>2.79076</b>	<b>0.49397</b>	<b>5.650</b>	<b>3.06e-06***</b>
<b>2012 vs. 2011</b>	<b>1.79975</b>	<b>0.40407</b>	<b>4.454</b>	<b>0.001601**</b>
<b>2013 vs. 2011</b>	<b>2.50232</b>	<b>0.41873</b>	<b>5.976</b>	<b>4.34e-07***</b>
<b>2014 vs. 2011</b>	<b>1.59730</b>	<b>0.42165</b>	<b>3.788</b>	<b>0.028833*</b>
<b>2015 vs. 2011</b>	<b>2.45761</b>	<b>0.42279</b>	<b>5.813</b>	<b>1.17e-06***</b>
<b>2016 vs. 2011</b>	<b>3.17536</b>	<b>0.44523</b>	<b>7.132</b>	<b>1.88e-10***</b>
<b>2017 vs. 2011</b>	<b>2.70769</b>	<b>0.47772</b>	<b>5.668</b>	<b>2.75e-06***</b>
2013 vs. 2012	0.70257	0.37692	1.864	1.000000
2014 vs. 2012	-0.20245	0.38378	-0.528	1.000000
2015 vs. 2012	0.65786	0.38270	1.719	1.000000
2016 vs. 2012	1.37562	0.40607	3.388	0.133954
2017 vs. 2012	0.90795	0.44232	2.053	1.000000
2014 vs. 2013	-0.90503	0.39896	-2.268	1.000000
2015 vs. 2013	-0.04472	0.39839	-0.112	1.000000
2016 vs. 2013	0.67304	0.42113	1.598	1.000000
2017 vs. 2013	0.20537	0.45603	0.450	1.000000
2015 vs. 2014	0.86031	0.40281	2.136	1.000000
2016 vs. 2014	1.57807	0.42682	3.697	0.041414*
2017 vs. 2014	1.11040	0.46044	2.412	1.000000
2016 vs. 2015	0.71776	0.42614	1.684	1.000000
2017 vs. 2015	0.25009	0.46037	0.543	1.000000
2017 vs. 2016	-0.46767	0.48043	-0.973	1.000000