Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts.

Supplementary Information

SI Table 1. Arctic char. Basic statistics (arithmetic means and SE) on year, n, length, muscle δ^{15}N (‰), selected POPs (ng/g lipid weight), mean AOI index (October-March), sum of monthly mean air temperature May-August (Temp.) (^{o}C). n.a.: not analysed.

Year	n	Length	SE	δ^{15}N	SE	$\sum_{10}$PCBs	SE	$\sum$DDTs	SE	HCB	SE	α-HCH	SE	AOI	Temp.
1994	25	40.8	1.6	n.a.	n.a.	1454.9	290.8	671.4	131.6	46.5	16.3	10.34	0.48	0.177	23.5
1999	19	42.4	0.9	10.43	0.09	728.9	150.5	207.6	37.2	29.7	1.7	6.73	0.40	-0.117	24.9
2004	20	37.0	0.7	10.84	0.10	785.3	162.4	259.1	48.2	50.9	3.0	5.45	0.44	-0.444	26.3
2006	20	38.4	1.4	9.34	0.15	670.4	176.2	245.4	61.1	42.5	3.5	4.00	0.28	-0.628	24.7
2008	20	38.7	1.2	11.04	0.12	380.1	72.1	180.0	26.3	54.2	4.2	3.79	0.27	0.505	26.0
2010	20	35.5	0.8	12.79	0.08	582.4	107.3	221.3	41.1	74.5	13.6	4.94	0.71	-1.964	33.1
2012	14	38.2	0.9	11.28	0.13	539.4	71.8	188.1	23.2	54.6	6.5	2.28	0.29	0.877	28.7
2014	15	37.5	1.1	10.80	0.14	257.2	33.8	74.8	11.7	31.7	4.1	2.07	0.25	0.675	28.0
2017	2	48.0	6.0	13.46	0.04	281.5	35.7	93.6	12.4	51.5	6.1	0.78	0.14	0.319	25.5

SI Table 2. Summary of linear regressions between annual mean predictor variables and year during study periods. Significant ($p < 0.05$) relationships are shown in bold.

Species/location		Slope	R^2	p-value
Arctic char	Fish length		0.01	0.86
Isortoq	$\delta^{15}N$		0.39	0.10
South West Greenland	AOI (Oct.-Mar.)	0.020	0.03	0.48
	Air temp.	-0.033	<0.01	0.82
Ringed seals	Age	-0.101	0.55	**<0.01**
Qeqertarsuaq	$\delta^{15}N$	0.008	<0.01	0.84
central West Greenland	Ice extent	-0.081	0.18	**<0.01**
	AOI (Oct.-Mar.)	0.010	0.01	0.61
	Temp. Fylla Bank	0.018	0.03	0.38
	Sal. Fylla Bank	-0.005	0.03	0.41
Ringed seals	Age	0.007	<0.01	0.88
Ittoqqortoormiit	$\delta^{15}N$	-0.053	0.22	0.09
East Greenland	Ice extent	-0.030	0.08	0.11
	AOI (Oct.-Mar.)	-0.009	0.01	0.51
	Temp, north of 80° N	0.111	0.75	**<0.01**

SI Table 3. Ringed seal, West Greenland. Basic statistics (arithmetic means and SE) on year, n, Age, males/females (N/F), muscle $\delta^{15}N$ (‰), selected POPs (ng/g lipid weight), mean AOI index (November-May), temperature (Temp.) and salinity (Sal.) preceding summer of surface water (0 – 40 m) at Fylla Bank. September sea ice extent (10^3 km^2) preceding year in Baffin Bay (Ice).

Year	n	Age	SE	M/F	$\delta^{15}N$	SE	$\sum_{10}$PCBs	SE	$\sum$DDTs	SE	HCB	SE	α-HCH	SE	AOI	Temp.	Sal.	Ice
1994	23	2.5	0.5	10/13	14.05	0.14	275.4	18.5	464.1	29.3	12.5	1.1	111.7	7.2	0.177	1.50	33.57	81.7
1999	8	2.6	0.9	4/4	14.49	0.30	304.8	47.7	482.7	83.9	8.2	0.9	57.0	7.3	-0.117	3.34	33.60	58.0
2000	16	1.2	0.3	12/4	14.05	0.10	206.7	19.9	341.4	39.8	8.3	0.6	48.3	3.3	0.591	2.60	33.48	67.9
2001	10	0.4	0.2	5/5	14.37	0.36	152.2	17.8	230.3	30.7	7.4	0.7	51.9	3.7	-1.147	2.45	33.32	61.2
2002	11	0.2	0.1	9/2	14.75	0.15	173.0	16.0	274.5	35.1	7.1	0.3	42.3	3.5	0.631	1.74	33.40	62.1
2004	20	0.3	0.2	13/7	15.53	0.09	149.8	19.7	213.2	22.7	9.5	0.9	49.6	4.6	-0.444	2.67	33.57	44.4
2006	19	0.5	0.2	12/7	14.38	0.09	184.0	12.8	269.8	21.3	8.1	0.6	36.3	3.4	-0.628	3.78	33.51	39.6
2008	20	0.5	0.2	13/7	14.31	0.21	127.5	11.2	215.6	19.4	8.2	0.7	23.7	1.1	0.505	1.84	33.49	41.4
2010	17	0.2	0.1	11/6	16.41	0.24	169.6	30.1	247.0	31.7	7.0	0.6	30.6	4.6	-1.964	2.44	33.80	39.5
2012	15	0.0	0.0	9/6	13.18	0.15	107.0	12.9	154.6	19.4	7.2	0.4	13.9	1.5	0.877	2.25	33.61	33.1
2014	10	0.3	0.3	5/5	14.47	0.19	214.7	43.0	321.2	72.6	9.1	0.9	10.8	0.9	0.675	2.38	33.41	60.2
2016	10	0.1	0.1	6/4	14.38	0.26	131.8	23.2	184.5	38.5	10.7	1.5	11.2	1.2	0.324	1.10	33.57	68.8

SI Table 4. Ringed seal, East Greenland. Basic statistics (arithmetic means and SE) on year, *n*, Age, Males/Female (M/F), muscle $\delta^{15}N$ (‰), selected POPs (ng/g lipid weight), mean AOI index (October-March). Preceding year's anomaly temperature north of 80°N. September sea ice extent (10^3 km^2) preceding year in the Greenland Sea.

Year	N	Age	SE	M/F	$\delta^{15}N$	SE	$\sum_{10}$PCBs	SE	∑DDTs	SE	HCB	SE	*α*-HCH	SE	AOI	Temp.	Ice
1986	16	3.0	0.2	9/7	13.82	0.21	1144.6	89.8	1836.3	168.1	24.4	3.5	209.0	15.9	-0.611	0.0	175
1994	25	4.8	0.6	14/11	15.56	0.20	1016.2	150.2	1534.2	242.8	18.0	1.1	133.0	16.3	0.177	-0.7	410
1999	18	4.7	0.6	11/7	14.51	0.38	567.8	90.5	665.1	85.9	13.1[1]	1.4[1]	74.5	12.9	-0.117	0.7	352
2000	16	4.7	0.6	8/8	15.84	0.11	846.3	205.5	1216.7	328.0	17.0	2.1	66.8	10.1	0.591	1.0	330
2001	20	6.6	1.4	11/9	14.59	0.26	641.7	65.0	832.9	98.9	13.8	1.1	45.4	3.1	-1.147	1.1	326
2002	19	4.6	0.5	11/8	15.35	0.16	655.3	46.6	771.6	55.6	12.9	1.1	45.1	5.0	0.631	0.8	160
2003	20	5.9	0.8	13/7	14.88	0.36	562.6	42.3	700.5	53.3	10.8	0.7	42.8	2.6	-0.654	0.1	127
2004	19	3.4	0.5	11/8	14.81	0.12	569.1	52.9	675.8	65.9	11.8	1.1	35.8	2.4	-0.444	0.3	137
2006	30	7.5	1.3	15/15	13.79	0.18	762.0	109.0	944.1	138.3	10.6	0.8	26.9	2.5	-0.628	2.3	335
2008	27	4.2	0.5	16/11	13.71	0.21	424.7	19.0	536.1	23.6	11.9	0.7	23.1	1.0	0.505	2.3	401
2010	28	6.2	0.9	15/13	14.61	0.14	517.1	60.6	708.2	90.5	8.5	0.5	15.2	0.8	-1.964	2.0	314
2012	20	3.8	0.7	12/8	12.68	0.23	366.5	30.8	509.3	46.4	10.2	0.8	11.9	0.6	0.877	1.8	326
2014	20	3.5	0.8	12/8	14.19	0.19	344.5	29.7	450.2	48.0	10.9	0.7	14.7	2.6	0.675	1.6	179
2016	16	3.9	1.3	11/5	13.12	0.23	460.8	72.0	580.0	89.0	8.3	0.5	8.6	1.1	0.324	2.4	228

[1] Three outliers removed

SI Table 5. Correlations between annual means of POP compounds and predictors. Temp=Temperature, Sal=Salinity,Ice=ice coverage. * denotes $p<0.05$, ** denotes $p<0.01$

Arctic char

	Year	Length	$\sum_{10}$PCBs	CB-153	∑DDTs	HCB	α-HCH	δ^{15}N	AOI	Temperature
Year	1.00	0.23	-0.83*	-0.77*	-0.74	0.30	-0.94*	0.61	0.35	0.33
Length		1.00	-0.33	-0.36	-0.47	-0.28	-0.38	0.40	0.33	-0.55
$\sum_{10}$PCBs			1.00	0.99	0.92**	0.02	0.83*	-0.46	-0.53	-0.08
CB-153				1.00	0.93**	0.07	0.76*	-0.46	-0.51	-0.05
∑DDTs					1.00	0.28	0.76	-0.39	-0.58	0.02
HCB						1.00	-0.06	0.63	-0.48	0.69
α-HCH							1.00	-0.41	-0.59	-0.01
δ^{15}N								1.00	-0.13	0.44
AOI									1.00	-0.46

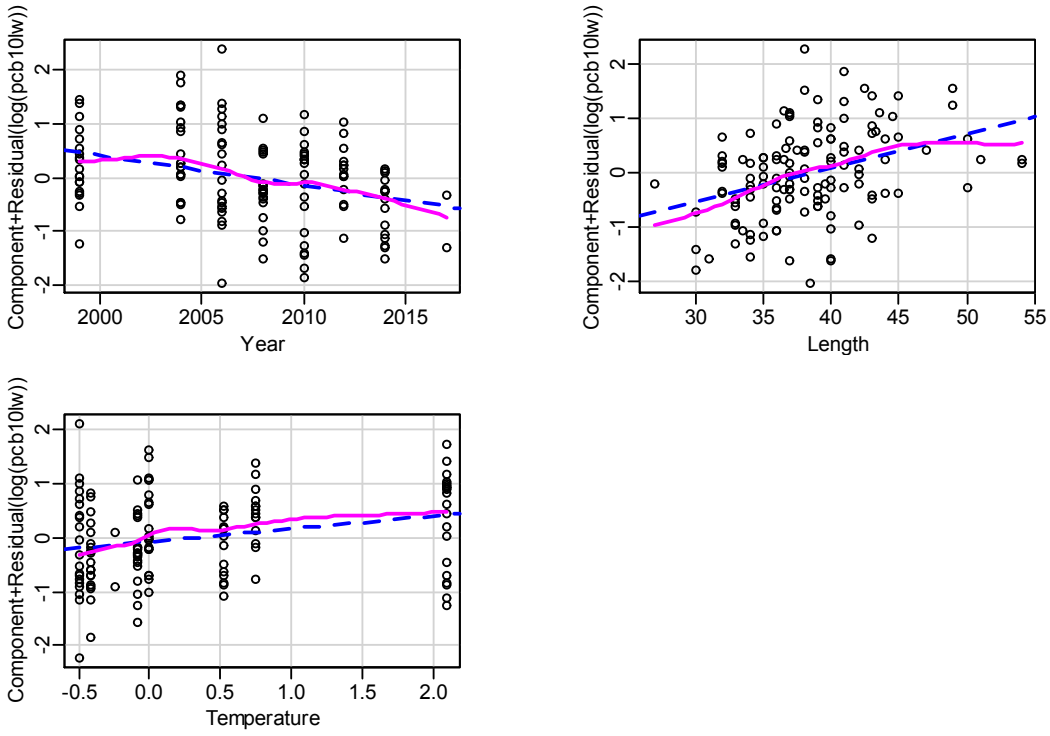
Ringed seal, West Greenland

	Year	Age	$\sum_{10}$PCBs	CB52	CB-153	∑DDTs	HCB	α-HCH	δ^{15}N	AOI	Temp	Sal	Ice
Year	1.00	0.74**	-0.62*	-0.73**	-0.52	-0.69*	-0.18	-0.91**	-0.03	0.08	-0.19	0.19	-0.45
Age		1.00	0.89**	0.80**	0.79**	0.93**	0.46	0.77**	-0.17	0.08	0.16	0.11	0.53
$\sum_{10}$PCBs			1.00**	0.85**	0.98**	0.99**	0.36	0.65*	0.03	0.00	0.29	0.05	0.54
CB-52				1.00	0.82**	0.87**	0.55	0.84**	0.05	-0.08	0.04	-0.10	0.69*
CB-153					1.00	0.95**	0.29	0.54*	0.09	0.00	0.32	0.02	0.50
∑DDTs						1.00	0.38	0.70*	-0.03	0.07	0.22	0.02	0.58*
HCB							1.00	0.49	-0.18	0.25	-0.43	0.07	0.64*
α-HCH								1.00	0.01	-0.13	0.00	-0.01	0.55
δ^{15}N									1.00	-0.73**	0.16	0.41	-0.22
AOI										1.00	-0.37	-0.36	0.27
Temp											1.00	0.05	-0.45
Sal												1.00	-0.35

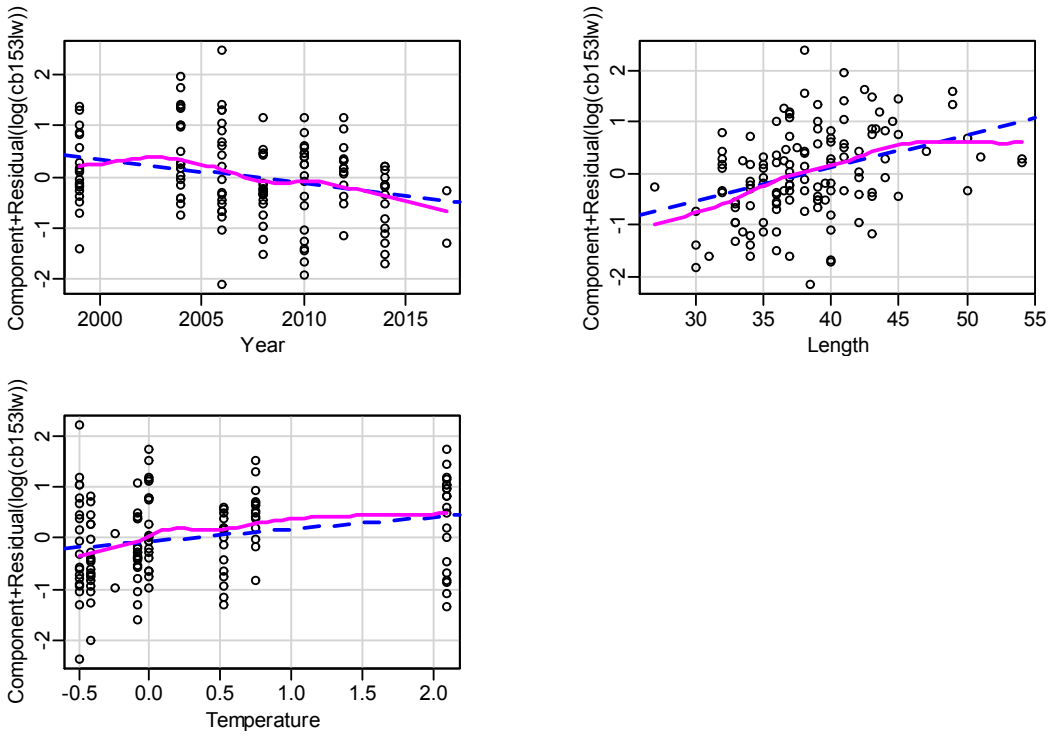
SI Table 5, continued

Ringed seal, East Greenland

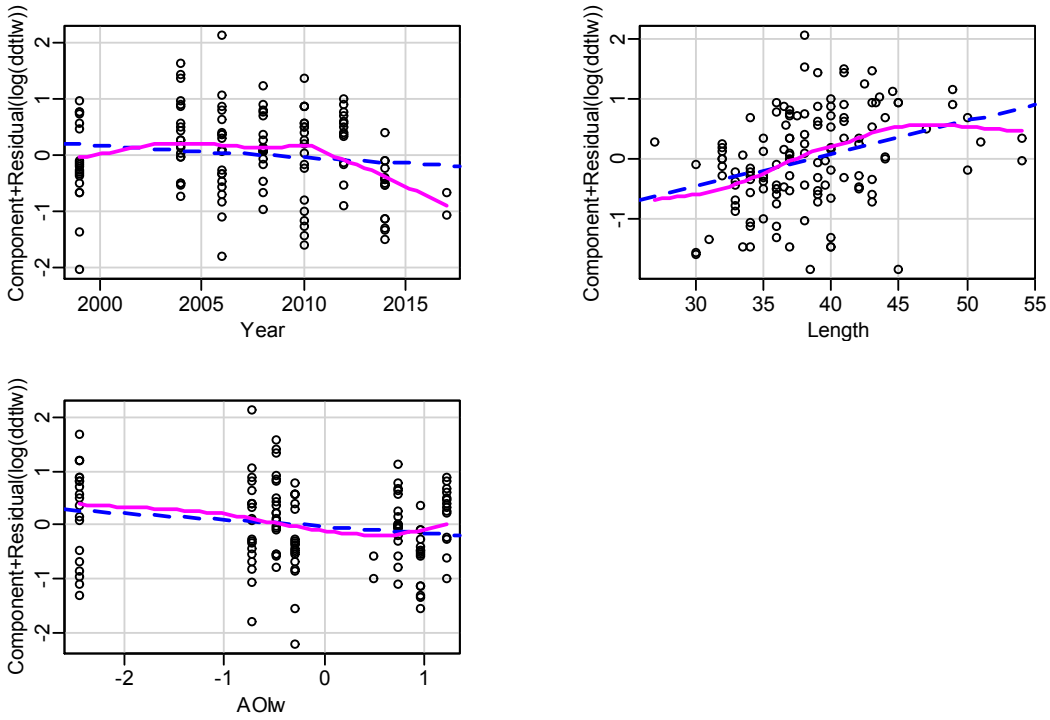
	Year	Age	$\sum_{10}$PCBs	CB52	CB-153	∑DDTs	HCB	α-HCH	δ^{15}N	AOI	Temp	Ice
Year	1.00	0.05	-0.89	-0.94	-0.81	-0.87	-0.88	-0.92	-0.47	0.18	0.79	0.04
Age		1.00	0.05	-0.08	0.13	-0.05	-0.30	-0.27**	0.21	-0.59	0.20	0.31
$\sum_{10}$PCBs			1.00**	0.96	0.98	0.98	0.87	0.88	0.43	-0.17	-0.63	0.05
CB-52				1.00	0.90	0.97	0.92	0.96	0.41	-0.14	-0.71	0.05
CB-153					1.00	0.95	0.82	0.79	0.43	-0.17	-0.51	0.10
∑DDTs						1.00	0.91	0.92	0.35	-0.14	-0.61	0.07
HCB							1.00	0.93	0.31	0.06	-0.64	-0.05
α-HCH								1.00	0.26	-0.07	-0.72	-0.04
δ^{15}N									1.00	-0.13	-0.61	-0.09
AOI										1.00	0.05	0.05
Temp											1.00	0.30



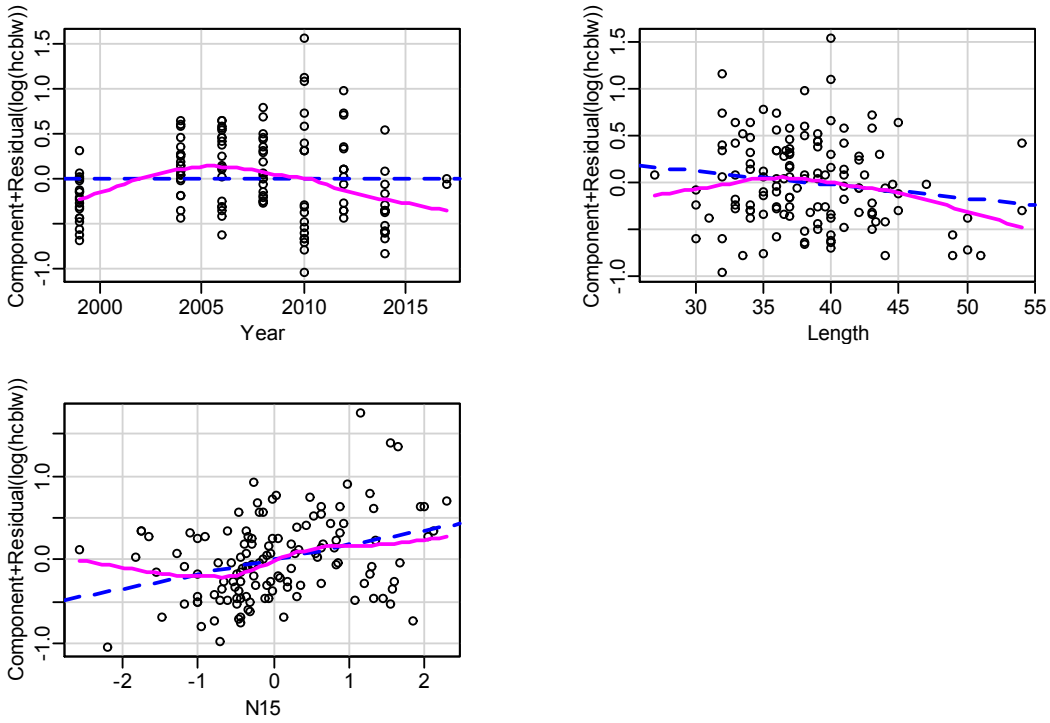
SI Figure 1. Component-residuals plots show the relationships between $\sum_{10}$PCB concentrations in Arctic char from Isortoq, Southwest Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



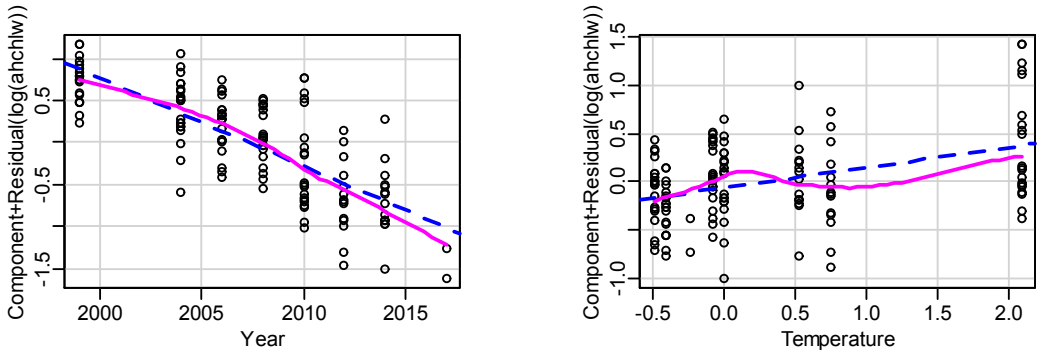
SI Figure 2. Component-residuals plots show the relationships between CB-153 concentrations in Arctic char from Isortoq, Southwest Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



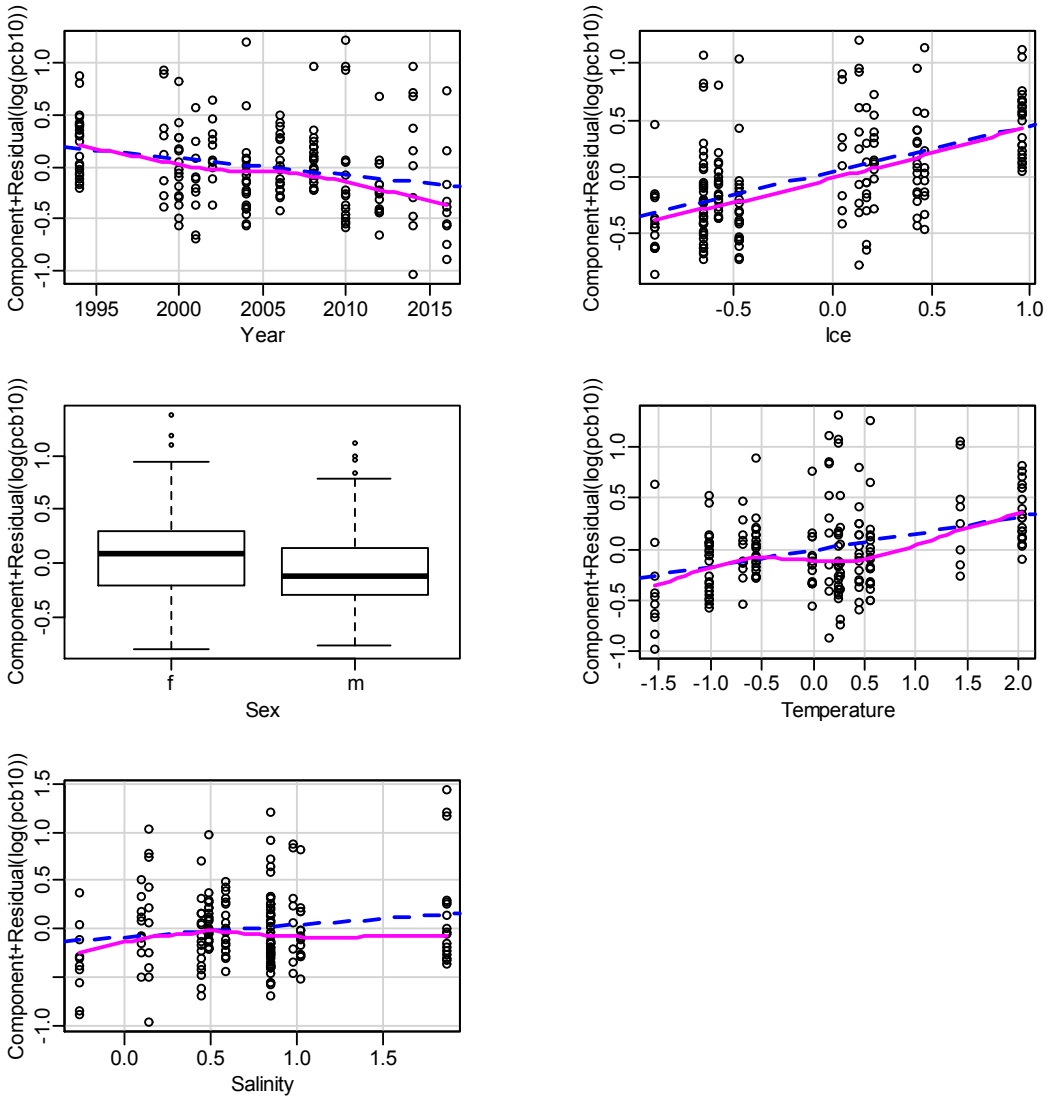
SI Figure 3. Component-residuals plots show the relationships between ∑DDT concentrations in Arctic char from Isortoq, Southwest Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



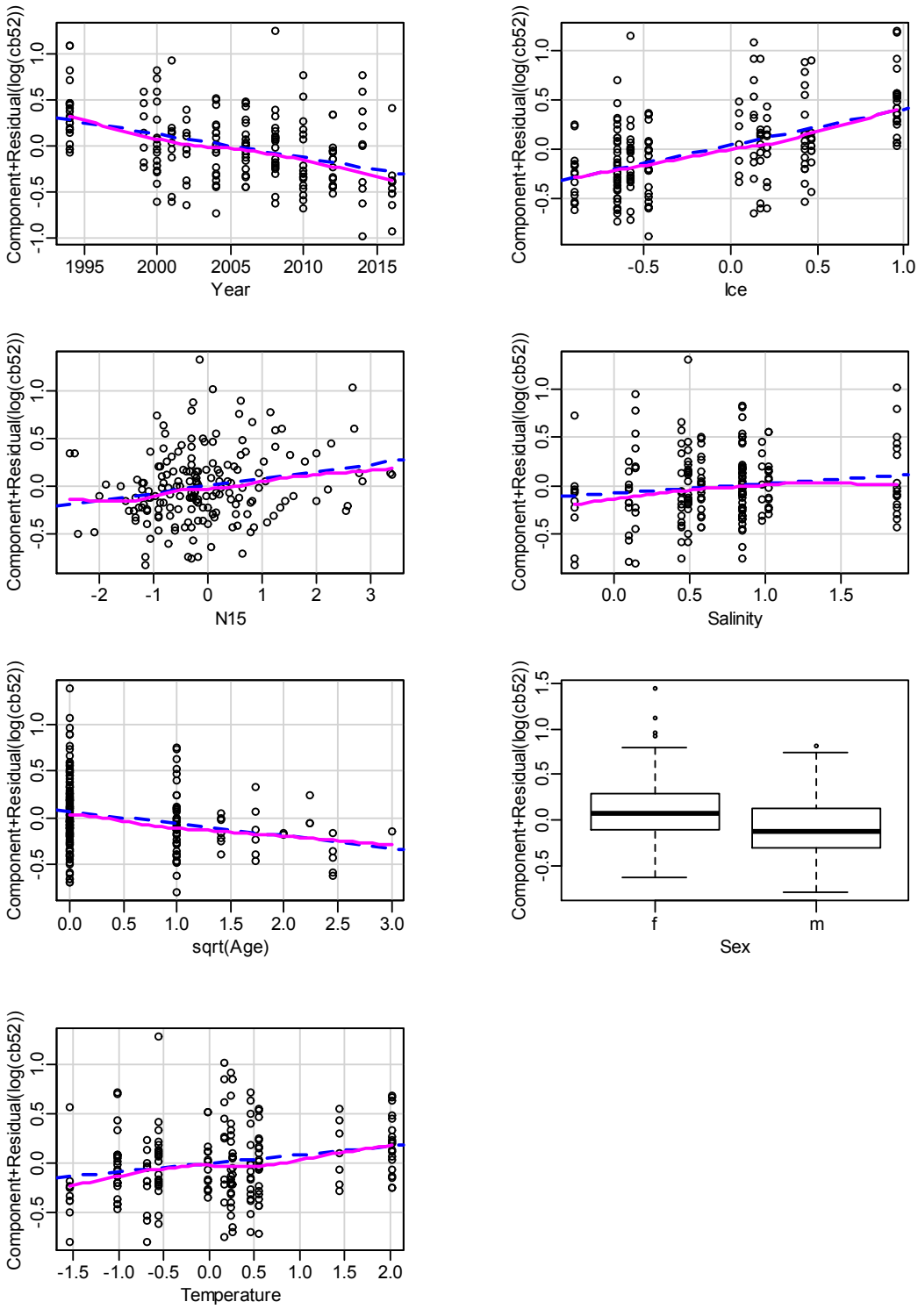
SI Figure 4. Component-residuals plots show the relationships between HCB concentrations in Arctic char from Isortoq, Southwest Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



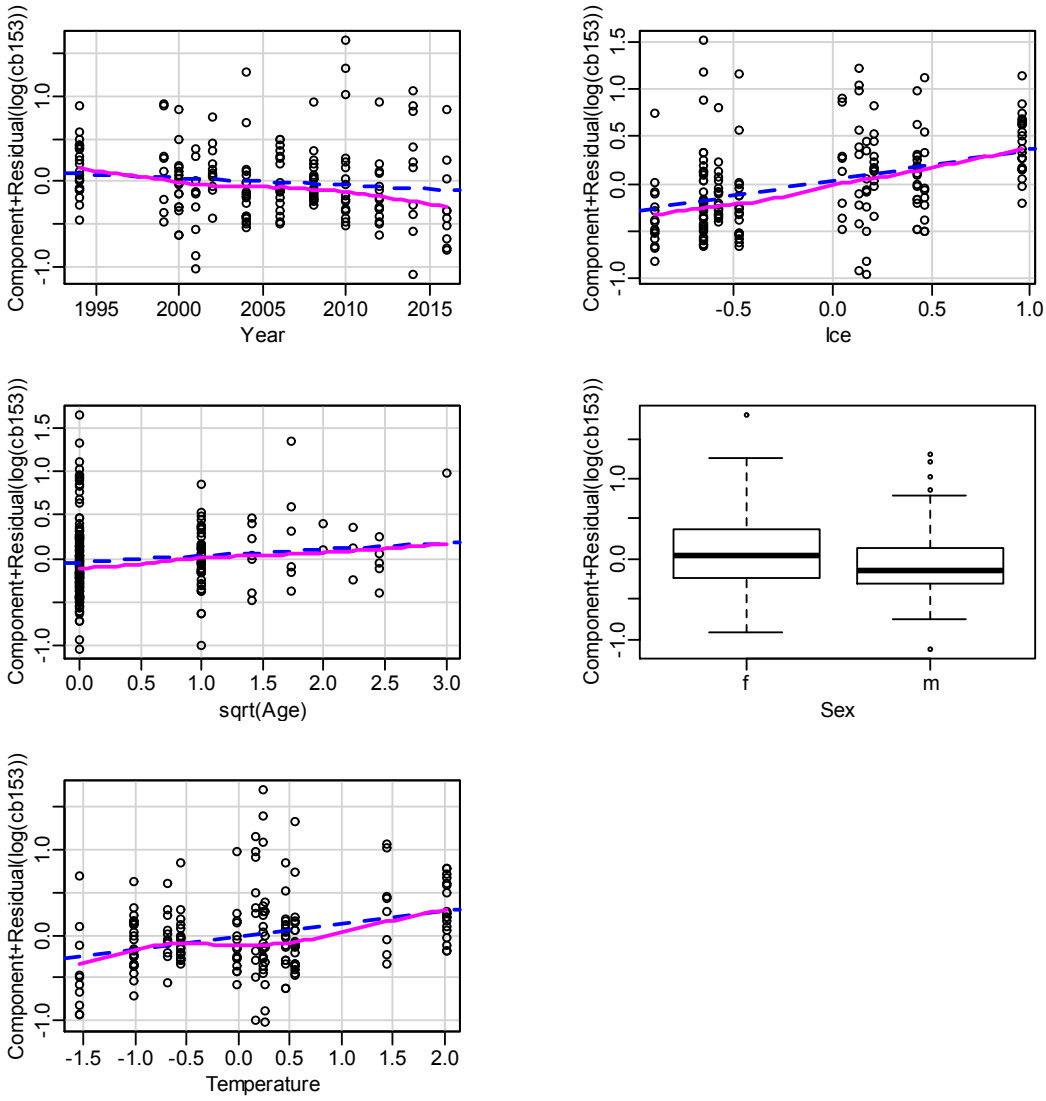
SI Figure 5. Component-residuals plots show the relationships between α-HCH concentrations in Arctic char from Isortoq, Southwest Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



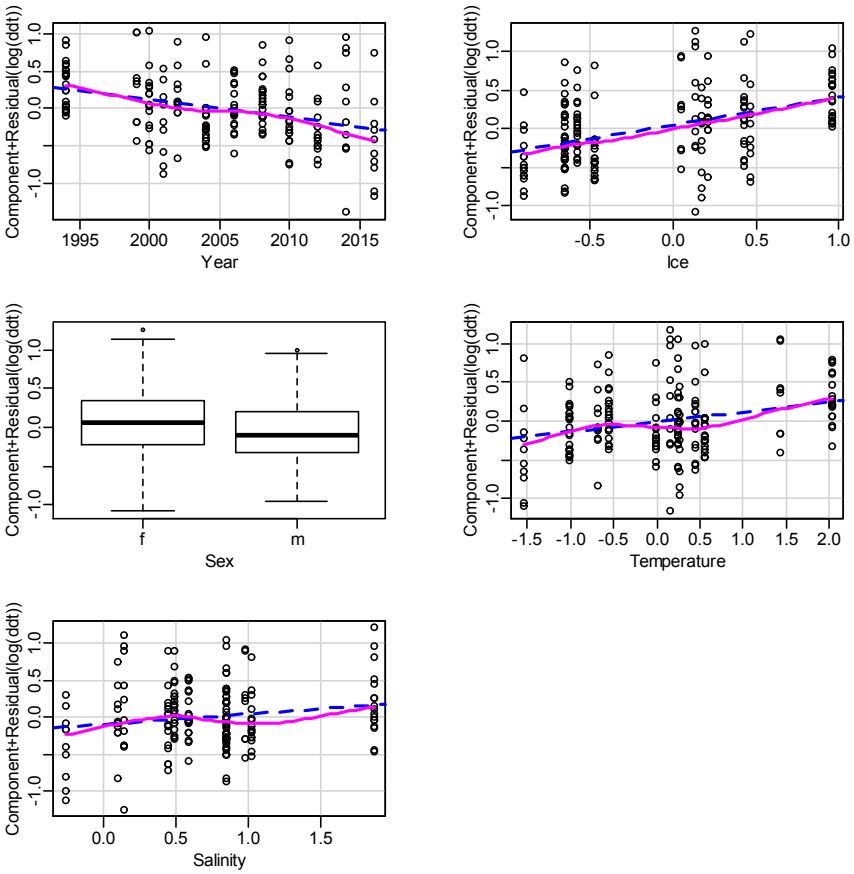
SI Figure 6. Component-residuals plots show the relationships between $\sum_{10}$PCB concentrations in ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



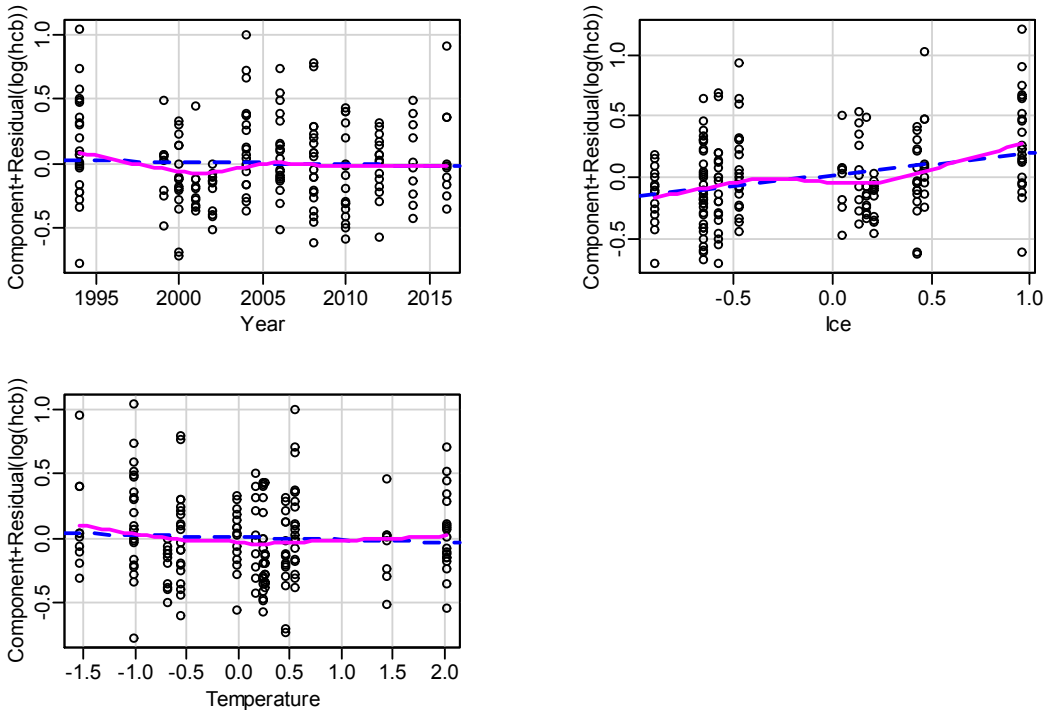
SI Figure 7. Component-residuals plots show the relationships between CB-52 concentrations in Ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



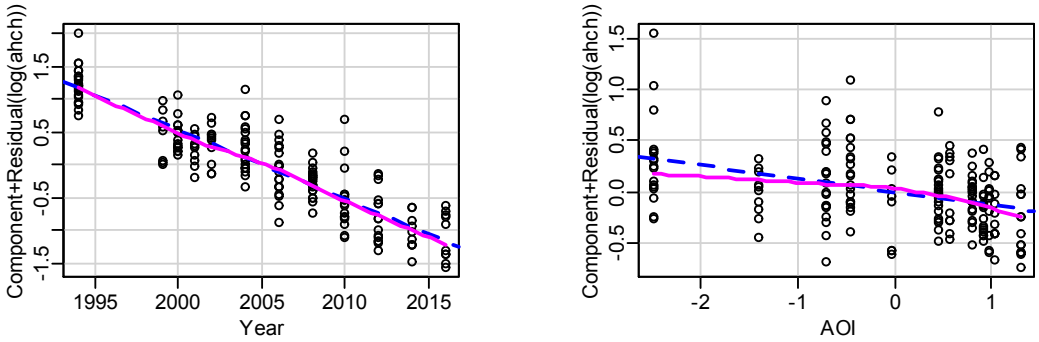
SI Figure 8 Component-residuals plots show the relationships between CB-153 concentrations in Ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



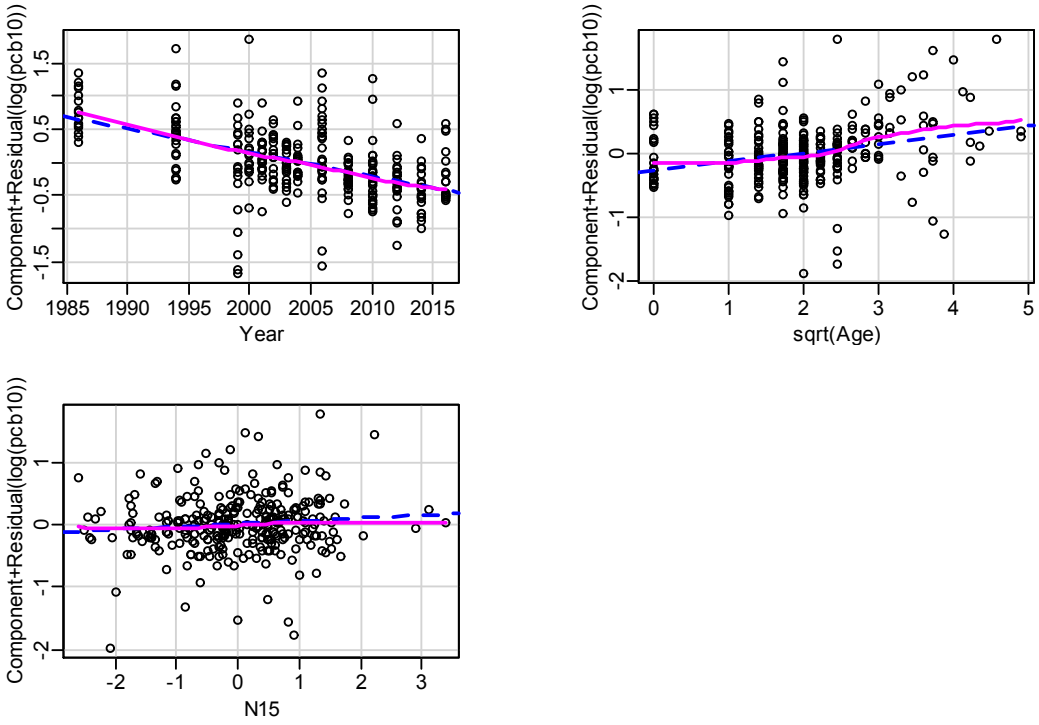
SI Figure 9. Component-residuals plots show the relationships between ∑DDT concentrations in Ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



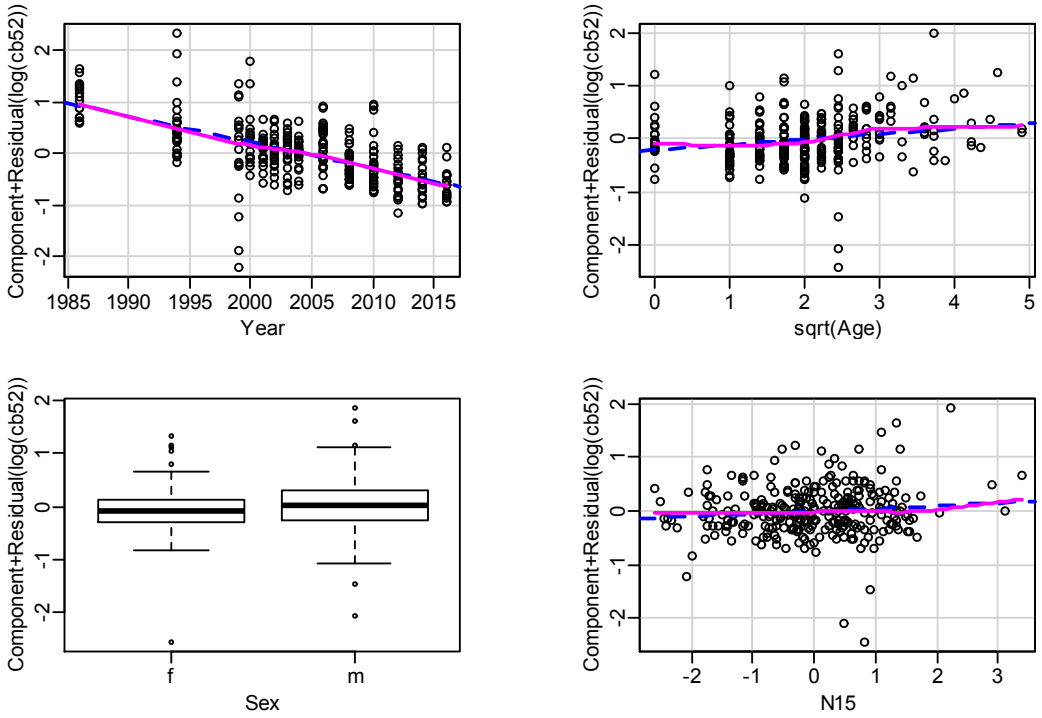
SI Figure 10. Component-residuals plots show the relationships between HCB concentrations in Ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



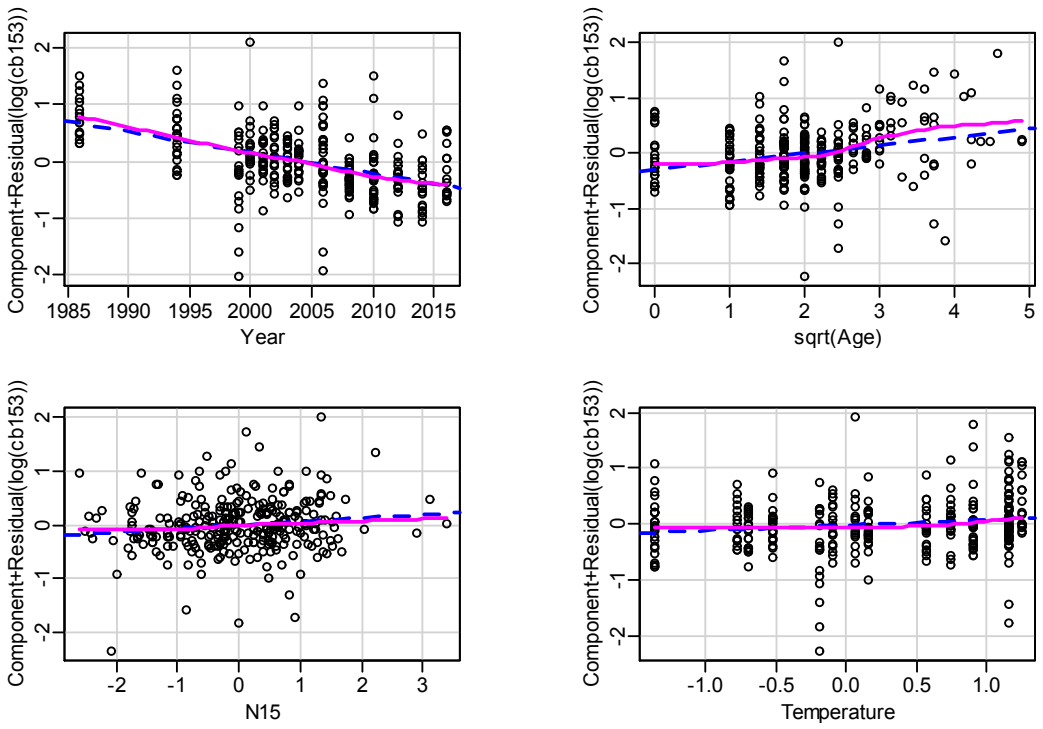
SI Figure 11. Component-residuals plots show the relationships between α-HCH concentrations in Ringed seals from Qeqertarsuaq, central West Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



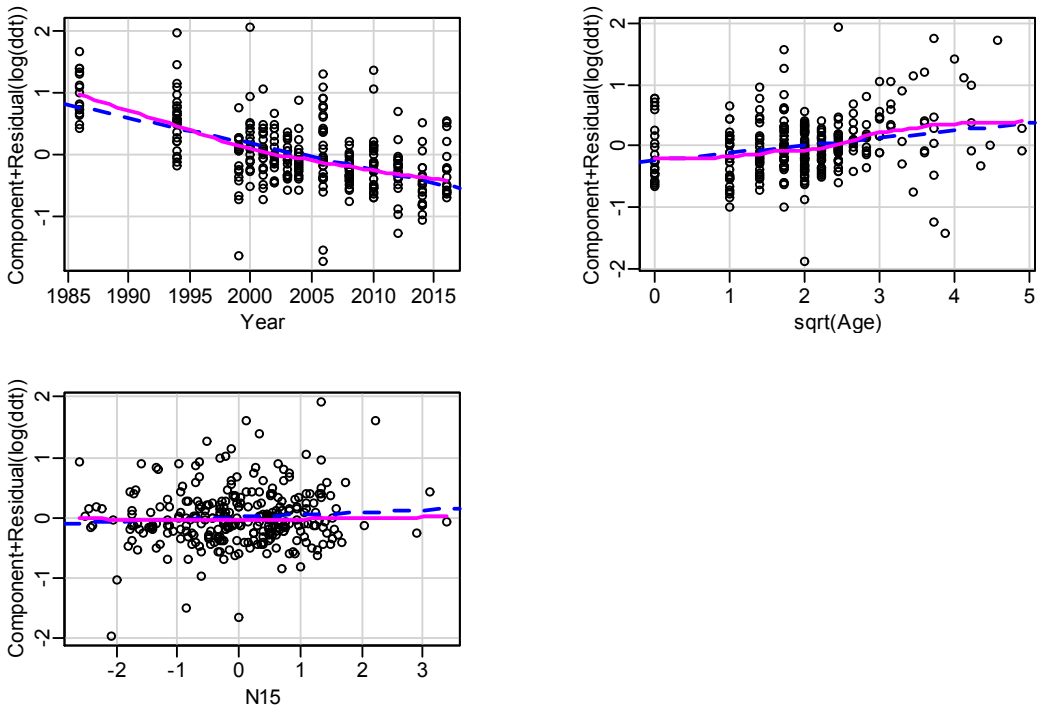
SI Figure 12. Component-residuals plots show the relationships between $\sum_{10}$PCB concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



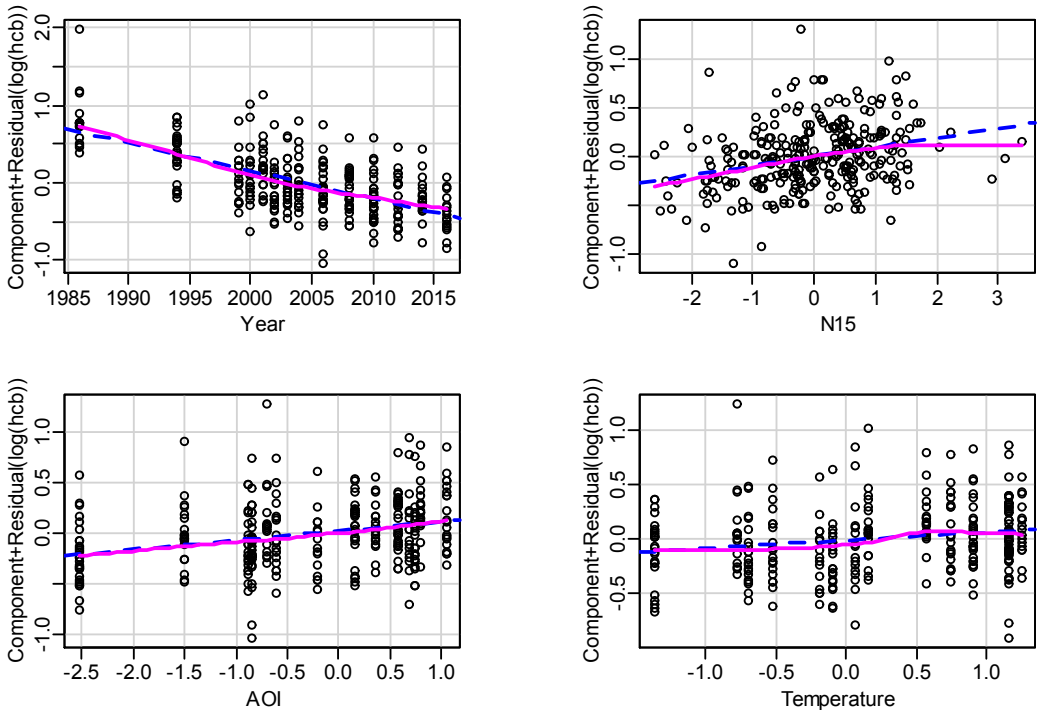
SI Figure 13. Component-residuals plots show the relationships between CB-52 concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



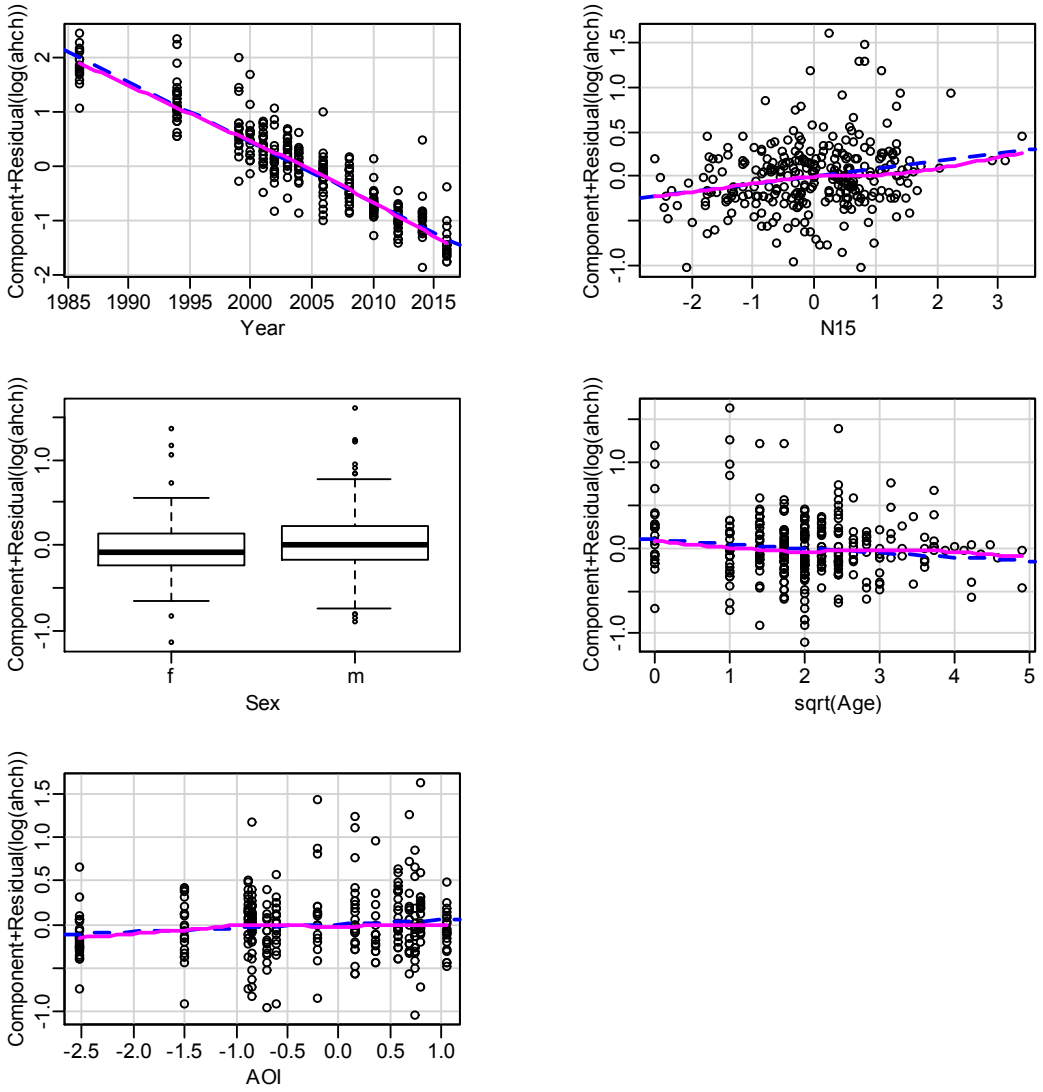
SI Figure 14. Component-residuals plots show the relationships between CB-153 concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



SI Figure 15. Component-residuals plots show the relationships between ∑DDT concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



SI Figure 16. Component-residuals plots show the relationships between HCB concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.



SI Figure 17. Component-residuals plots show the relationships between α-HCH concentrations in ringed seals from Ittoqqortoormiit, East Greenland and each of the predictors considered when controlled for the others. Plots are based on the most parsimonious model. The blue broken lines are least-squares lines and the pink line a smoother.