

**Predicting effects of exploitation rate on weight-at-age, population dynamics and bioaccumulation of PCDD/Fs and PCBs in herring (*Clupea harengus* L.) in the northern Baltic Sea**

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Supporting Information

**TABLE A. PCB congener concentrations in herring prey, assimilation efficiencies ( $AE_C$ ), proportion of eliminated congener during spawning ( $E_G\%$ ) and toxic equivalent factors (TEF) of each congener. In the Mysid/Amphipod column some of the values include more than one congener (indicated in brackets in the Congener column).**

Congener	Concentration in diet		$AE_C$	$E_G\%$	TEF
	Zooplankton	Mysids/Amphipods <sup>d</sup>			
	$\mu g g^{-1}$	$\mu g g^{-1}$			
PCB 81 <sup>a</sup>	0.191	0.191 <sup>b</sup>	0.97	2.5	0.00010
PCB 77 <sup>a</sup>	2.562	6.923	0.87	2.7	0.00010
PCB 126 <sup>a</sup>	0.509	2.598	0.92	2.4	0.10000
PCB 169 <sup>a</sup>	0.095	0.150	0.84	1.9	0.01000
	$ng g^{-1}$	$ng g^{-1}$			
PCB 18 <sup>(18/17)</sup>	0.016	0.089	0.80	5.6	
PCB 28/31	0.039	0.330	0.52	2.2	
PCB 33	0.010	0.053	0.37	13.2	
PCB 51	0.001	0.006	0.80 <sup>c</sup>	6.1	
PCB 52	0.040	0.251	0.80 <sup>c</sup>	3.5	
PCB 49	0.019	0.068	0.80 <sup>c</sup>	3.0	
PCB 47 <sup>(47/48)</sup>	0.012	0.074	0.80 <sup>c</sup>	3.3	
PCB 74	0.017	0.185	0.93	2.6	
PCB 66	0.025	0.265	0.94	2.6	
PCB 60 <sup>(56/60)</sup>	0.005	0.157	0.80 <sup>c</sup>	2.4	
PCB 101 <sup>(101/90)</sup>	0.093	0.506	0.92	2.9	
PCB 99 <sup>(99/113)</sup>	0.037	0.270	0.80	2.6	
PCB 110	0.069	0.612	0.86	2.8	
PCB 123 <sup>a</sup>	0.007	0.038	0.74	2.7	0.00010
PCB 118 <sup>a</sup>	0.074	0.405	0.78	2.7	0.00010
PCB 114 <sup>a</sup>	0.001	0.005	0.80 <sup>c</sup>	2.9	0.00050
PCB 122	0.001	0.001 <sup>b</sup>	0.80 <sup>c</sup>	3.0	
PCB 105 <sup>a</sup>	0.023	0.106	0.76	2.8	0.00010
PCB 153 <sup>(153/132)</sup>	0.175	1.177	0.83	2.7	
PCB 141	0.018	0.093	0.68	3.2	
PCB 138 <sup>(138/160/163/164)</sup>	0.139	1.036	0.77	2.8	
PCB 167 <sup>a</sup>	0.005	0.087	0.80 <sup>c</sup>	2.6	0.00001
PCB 128	0.017	0.269	0.96	2.7	
PCB 156 <sup>a</sup>	0.010	0.075	0.79	2.8	0.00050
PCB 157 <sup>a</sup>	0.001	0.014	0.80 <sup>c</sup>	2.7	0.00050
PCB 187 <sup>(187/182)</sup>	0.032	0.179	0.76	2.9	
PCB 183	0.017	0.084	0.80 <sup>c</sup>	2.8	
PCB 180 <sup>(180/193)</sup>	0.064	0.266	0.84	2.8	
PCB 170 <sup>(170/190)</sup>	0.029	0.078	0.80 <sup>c</sup>	3.0	
PCB 189 <sup>a</sup>	0.001	0.005	0.80 <sup>c</sup>	2.8	0.0001
PCB 194	0.006	0.012	0.84	2.7	
PCB 206	0.001	0.001 <sup>b</sup>	0.80 <sup>c</sup>	2.8	
PCB 209	0.001	0.001 <sup>b</sup>	0.80 <sup>c</sup>	3.2	

<sup>a</sup> Used in calculation of WHO-TEq

<sup>b</sup> No values for mysids/amphipods; zooplankton values used.

<sup>c</sup> Average assimilation efficiency of all the PCB congeners

<sup>d</sup> (30)

**Table B. PCDD/Fs concentrations in herring prey, assimilation efficiencies ( $AE_c$ ), proportion of eliminated congener during spawning ( $E_G\%$ ) and toxic equivalent factors (TEF) of each congener. The assimilation efficiency of the 23478-PeCDF congener was assumed to be dependent on herring weight.**

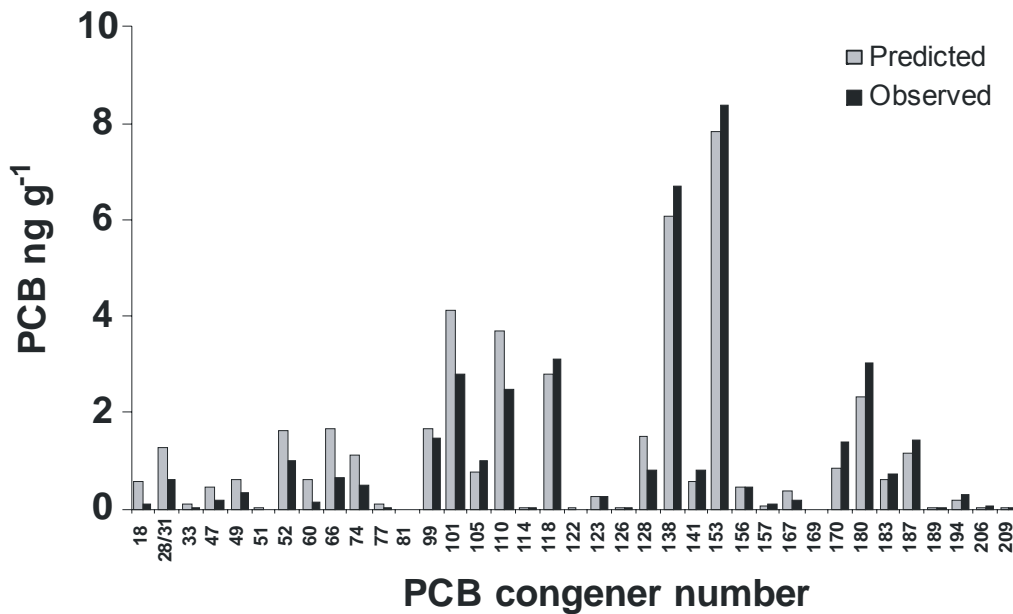
Congener	Concentration in diet ( $\mu\text{g g}^{-1}$ )		$AE_c$	$E_G\%$	TEF
	Zooplankton	Mysids/Amphipods <sup>c</sup>			
2378-TCDF <sup>a</sup>	0.212	0.397	0.64	2.8	0.10
2378-TCDD <sup>a</sup>	0.003	0.058	0.72	4.7	1.00
12378-PeCDF <sup>a</sup>	0.019	0.361	0.58	3.1	0.05
23478-PeCDF <sup>a</sup>	0.100	0.198	$0.2069 * W^{0.6797}$	2.5	0.50
12378-PeCDD <sup>a</sup>	0.020	0.112	0.64	2.7	1.00
123478-HxCDF <sup>a</sup>	0.005	0.076	0.33 <sup>b</sup>	3.8	0.10
123678-HxCDF <sup>a</sup>	0.004	0.056	0.32	2.2	0.10
234678-HxCDF <sup>a</sup>	0.006	0.110	0.33 <sup>b</sup>	2.6	0.10
123789-HxCDF <sup>a</sup>	0.008	0.106	0.33 <sup>b</sup>	19.0	0.10
123478-HxCDD <sup>a</sup>	0.006	0.233	0.33 <sup>b</sup>	5.6	0.10
123678-HxCDD <sup>a</sup>	0.016	0.158	0.34	2.4	0.10
123789-HxCDD <sup>a</sup>	0.005	0.195	0.33 <sup>b</sup>	7.0	0.10
1234678-HpCDF <sup>a</sup>	0.010	0.235	0.24 <sup>b</sup>	5.8	0.01
1234789-HpCDF <sup>a</sup>	0.007	0.358	0.24 <sup>b</sup>	15.9	0.01
1234678-HpCDD <sup>a</sup>	0.039	1.031	0.24	9.9	0.01
OCDF	0.017	0.861	0.00	13.0	0.0001
OCDD	0.194	4.849	0.00	12.8	0.0001

<sup>a</sup> Used in calculation of WHO-TEq

<sup>b</sup> average assimilation efficiency of congeners having same number of chlorine atoms

<sup>c</sup> (30)

## Figures



**FIGURE A** Predicted and observed PCB congener profiles of Bothnian Sea herring. Observed concentrations are grand means of five age group homogenates (ages 1, 2, 3, 6 and 10).

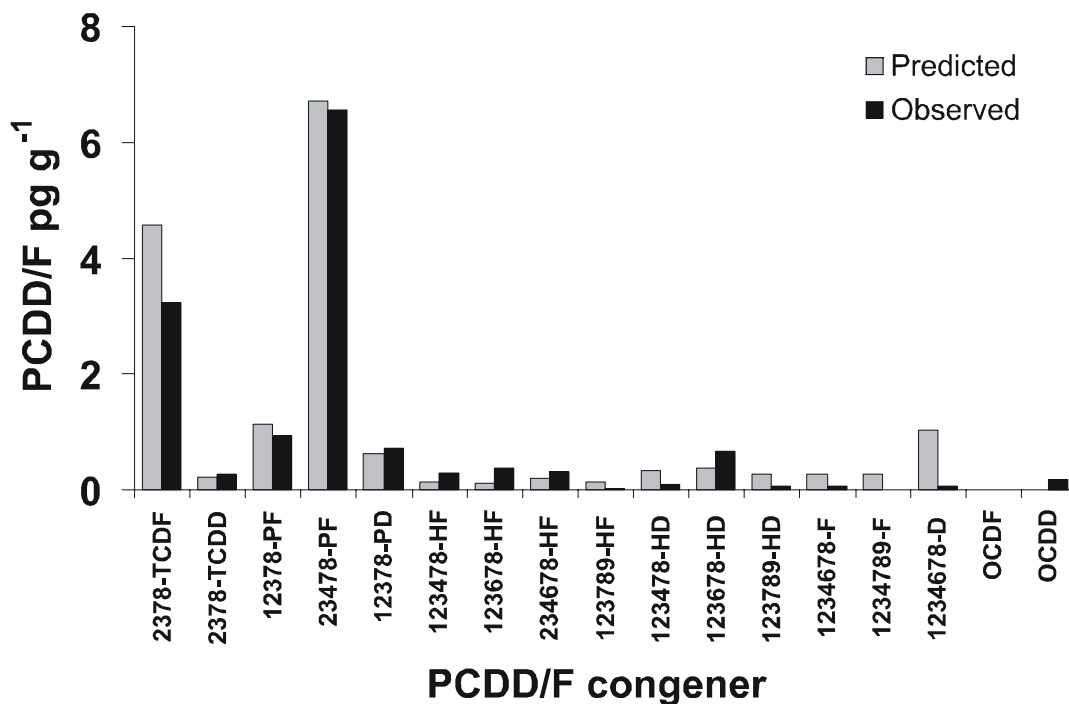


FIGURE B. Predicted and observed PCDD/F congener profiles of Bothnian Sea herring. Observed concentrations are grand means of five age group homogenates (ages 1, 2, 3, 6 and 10).

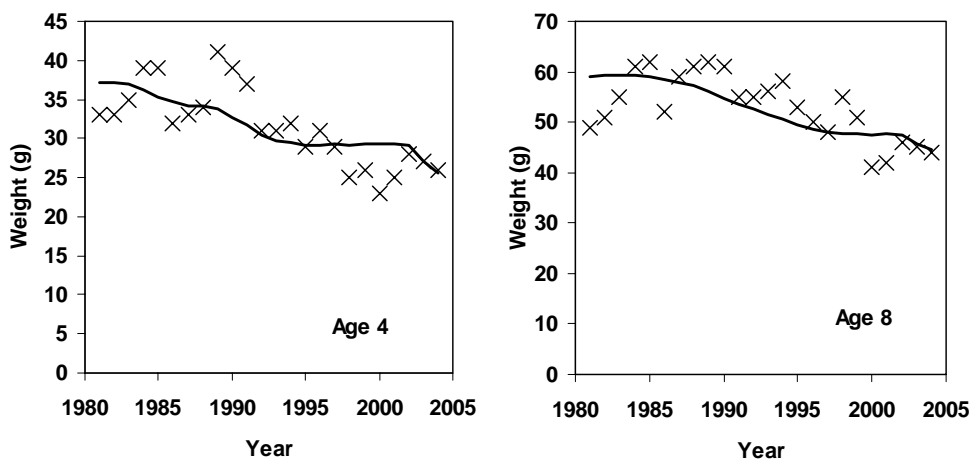


FIGURE C. The modeled weight (line) with the data (crosses) in age groups 4 and 8.

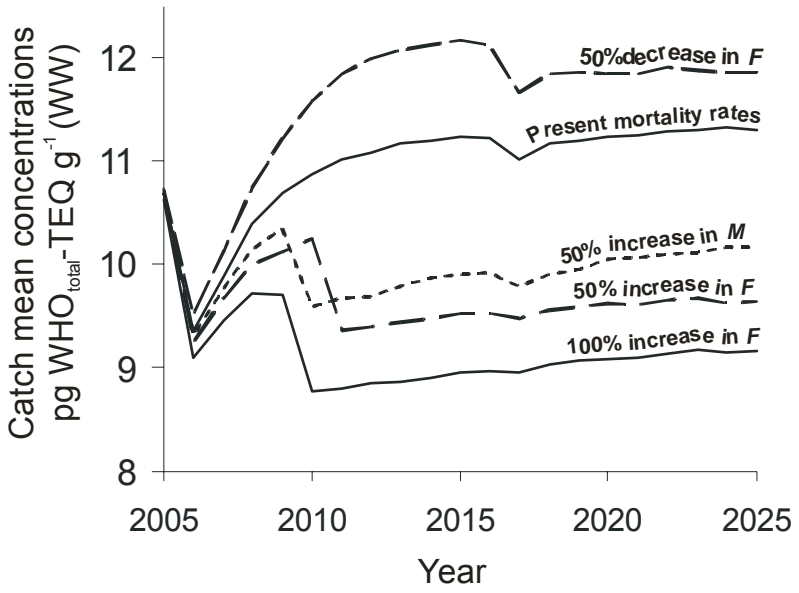


FIGURE D. Predicted temporal changes in mean WHO<sub>total</sub>-TEQs of catch used for human consumption ( $\geq 23$  g). All five scenarios are the averages of the simulations.

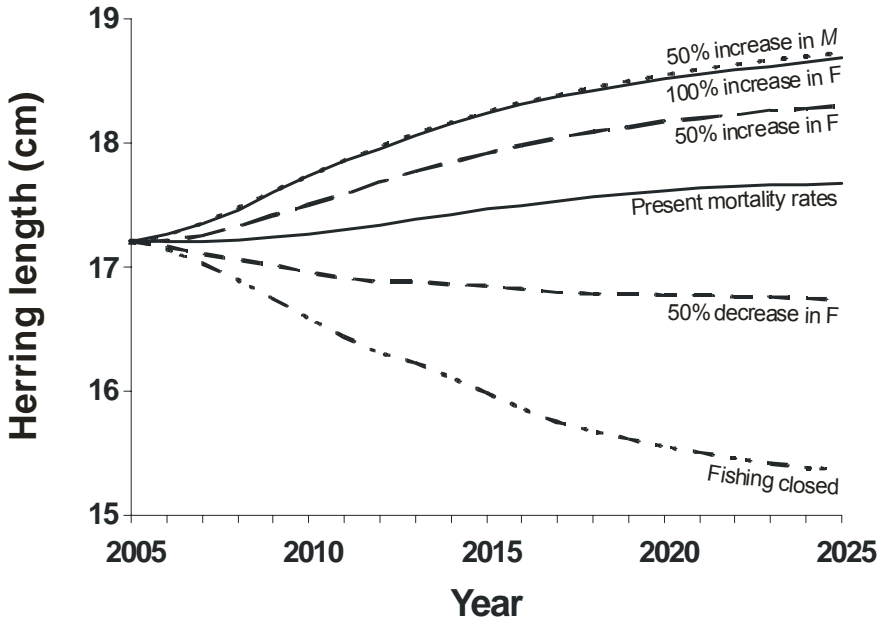


FIGURE E. Predicted impacts of different exploitation options on the average length of herring containing  $8 \text{ pg WHO}_{\text{total}}\text{-TEQ g}^{-1}$ , which is the EU maximum limit for PCDD/Fs and PCBs in foodstuff. All the scenarios are the averages of the simulations.