

LEVELS OF PCDDs, PCDFs, DIOXIN LIKE - PCBs IN FILLET OF NORWEGIAN EEL (*Anguilla anguilla*).

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Introduction

Norway is a major exporter of fish. Since 1993 the Norwegian authorities has an on going monitoring program on levels of POPs and heavy metals in edible parts of different fish species¹. The species of eel (*Anguilla anguilla*) was not included in the monitoring program. A project was started to investigate the levels of pollutants in this species. Sampling was done in the second part of 2002. The aim of the study was to investigate the range and levels of the same environmental pollutants. In this paper the results for the dioxins, furans and the dioxin like PCBs are be presented.

Materials and Methods

Inspectors from the Directorate of Fisheries collected 35 eels from 13 locations (fig. 1). The fish were individually wrapped in aluminium sheets, packed in polymer bags, frozen, and sent to NIFES for analysis. From each fish a fillet sample was homogenated, weighted and freeze-dried. Extraction used an ASE 300 (Dionex). A 6-channel Powerprep (Fluid Management Systems) was used to for clean-up. The fractions were concentrated under N₂ in a Turbovap II (Zymark). A

MAT-95 HRGC/HRMS (Thermo-Finnigan) was used for the analysis. The Isotope dilution method (modified EPA 1613 and 1668A methods^{2,3}), using mixtures of ¹³C labelled standards (Cambridge Isotope laboratories) were used for quantification of 17 PCDDs/PCDFs and the four non-ortho PCBs. All data discussed are the sums of the TEQs of the congeners, as upper bound limit of quantification based on wet weight.

Results and Discussion

For all 35 eels, the mean is 1.29 pg/g and the median is 0.81 pg/g. The range of individual fish is 0.29-4.23 pg/g. Only one fish is above the 4.0 pg/g limit of PCDD/PCDFs in food set by the EU. This individual fish was caught in a river location with no commercial fishing.

Comparing the locations by their mean levels, group them in three clusters. The locations in the three clusters do not represent regional differences.

Cluster I: Seven locations all with mean values <0.9pg/g. Locations 2,5,6,7,10,11,12 and 13. The locations in this cluster have small standard deviations. Cluster II: Three locations with mean values in the range of 1.1-1.9 pg/g. Location 1,3 and 9. Cluster III, location 8 and 4,with mean value range from 2.7 to 3.9 pg/g. These locations have no commercial fishing, and were not part of the design. The change in plan was done at the local initiative from the field inspectors.

The low standard deviations found in many of the locations give an indication that the differences found reflect local levels. The three clusters explain the difference between mean and median.

The non-ortho PCB values for all the 35 eel have a mean of 1.49 pg/g, a range of 0.036-5.18 Pg/g and a median of 0.99 pg/g. The mean of the location do not group them to the same three clusters. Now, the locations 2,3,5,6,7 and 10 have low levels,

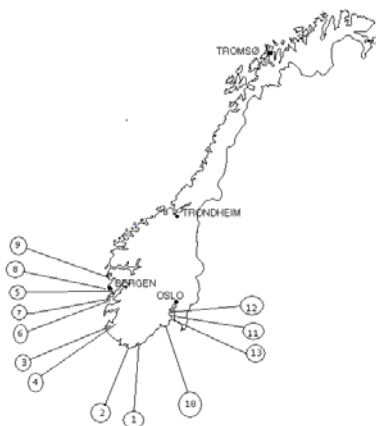


Fig 1. Map of sampling locations of eel from Norway.

followed by 9,1,12,4 and 13 with increasing levels, and the locations 8 and 11 form a separate high end cluster with levels in the range 3.04 to 3.61 pg/g. Location 8 have a known history of PCB pollution.

Table 1. Levels (mean \pm SD) of PCDDs/PCDFs and non-ortho PCBs. WHO-TEQs are expressed as pg/g wet weight.

Location	N	PCDDs/PCDFs ^a		Non-ortho PCBs ^a	
		Mean	S	Mean	S
1	3	1.33	0.6	1.49	0.5
2	3	0.81	0.1	1.18	0.4
3	3	1.13	0.3	0.76	0.4
4	3	3.88	0.3	2.23	0.4
5	6	0.64	0.2	0.87	0.4
6	2	0.43	0.2	0.66	0.1
7	3	0.63	0.7	1.12	0.4
8 ^b	8	2.67	0.5	3.61	1.9
9	3	1.81	0.8	1.38	1.3
10	3	0.56	0.04	0.85	0.3

11	1	0.76	-	3.04	-
12	1	0.63	-	2.06	-
13	1	0.46	-	2.78	-

- a) Upper bound limit of quantification. For each congener, any value below the quantification limit is assigned to the value of the quantification limit.
- b) There is a ban on commercial fishing in this location.

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References

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