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PCBs and DDT in Fish From Western Lake Superior

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Fish from western Lake Superior were collected as available with gill nets by the Wisconsin Department of Natural Resources (Apostle Island region) and the National Water Quality Laboratory (Little Two Harbors and Illgen City regions) during 1972 and 1973. The fish were frozen, homogenized, and analyzed for PCBs and DDT analogues. The presence of PCBs was confirmed by perchlorinating the PCBs to decachlorobiphenyl with $SbCl_5$.

Table 1 presents mean and standard deviations for the major chlorinated hydrocarbons in burbot, lake trout, chubs, herring, and smelt from the three sampling regions. The mean concentration (whole fish) of PCBs (most resembling Aroclor® 1254) ranged from 0.3 µg/gm in smelt to 1.8 µg/gm in lake trout. The maximum concentration of PCBs was 5.6 µg/gm in a large lake trout captured in the Apostle Island region.

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Table 1. Concentration of Major Chlorinated Hydrocarbons in Fish from Western Lake Superior.

Species	Number of Fish	Mean Weight[a] (gm)	Mean Lipid (percent)	Dieldrin (ug/gm)	pp' DDE (ug/gm)	Total DDT and Analogues[b] (ug/gm)	PCBs (ug/gm) Aroclor 1254
APOSTLE ISLAND REGION (Wisconsin) November, 1973							
Burbot	3	1290±200 (1057-1474)	6.2±1.4 (4.8-7.7)	0.03 (0.03)	0.7±0.3 (0.4-0.9)	0.4±0.2 (0.2-0.6)	1.4±0.4 (1.0-1.7)
Lake Trout	9	2600±1700 (257-5552)	8.9±3.6 (1.4-13.0)	0.03±0.02 (<0.03-0.05)	2.2±2.3 (0.05-6.9)	3.7±4.2 (0.1-12.8)	1.8±1.6 (0.3-5.6)
Long-Nose Sucker	8	970±160 (569-1073)	6.1±3.7 (1.9-12)	0.03±0.03 (<0.03-0.09)	0.8±0.9 (0.16-2.60)	1.5±1.6 (0.3-3.3)	0.9±0.8 (0.3-2.7)
Smelt	5	64±6 (57-72)	8.2±2.2 (6.7-12)	<0.03	0.17±0.04 (0.11-0.20)	0.26±0.06 (0.18-0.33)	0.4±0.1 (0.4-0.5)
LITTLE TWO HARBORS REGION (Minnesota) July, 1972							
Burbot	4	410±80 (320-502)	3.3±0.8 (2.3-4.2)	<0.03	0.2±0.2 (0.05-0.46)	0.4±0.3 (0.06-0.77)	0.5±0.5 (<0.9-1.0)
Chubs	14	172±75 (77-390)	11.1±8.2 (1.2-26.0)	<0.03	0.8±0.4 (0.03-1.65)	1.3±0.7 (0.69-3.01)	1.0±0.3 (0.40-1.60)
Herring	3	305±70 (231-370)	5.3±3.0 (1.9-7.8)	<0.03	0.6±0.2 (0.44-0.80)	1.3±0.6 (0.89-1.93)	2.0±1.0 (1.2-3.1)
Lake Trout	12	400±100 (202-552)	6.1±2.6 (2.6-13.0)	<0.03	0.5±0.2 (0.11-0.84)	0.9±0.4 (0.21-1.45)	0.8±0.4 (<0.3-1.5)
Smelt	8	40±10 (27-52)	2.1±2.9 (0.6-9.5)	<0.03	0.2±0.1 (0.06-0.41)	0.3±0.2 (0.10-0.68)	0.4±0.5 (<0.4-1.2)

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Table 1 con't.

Species	Number of Fish	Mean Weight[a] (gm)	Mean Lipid (percent)	Dieldrin (ug/gm)	p,p' DDE (ug/gm)	Total DDT Analogues[b] (ug/gm)	PCBs (ug/gm) Aroclor 1254
ILLGEN CITY REGION (Minnesota) July, 1972							
Burbot	6	430±300 (158-1006)	7.1±2.4 (4.0-10.2)	<0.03	0.5±0.2 (0.31-0.74)	0.8±0.3 (0.54-1.28)	0.9±0.3 (0.5-1.2)
Chubs	6	320±90 (245-484)	9.1±3.4 (5.2-12.8)	<0.03	0.5±0.2 (0.35-0.76)	1.3±0.4 (0.85-1.92)	0.7±0.2 (0.4-0.9)
Lake Trout	10	390±210 (106-733)	4.6±1.1 (2.8-6.9)	<0.03	0.6±0.4 (0.20-1.40)	0.9±0.5 (0.28-1.68)	0.7±0.3 (0.3-1.2)
Smelt	10	45±10 (39-66)	2.0±1.2 (1.4-4.6)	<0.03	0.2±0.1 (0.12-0.30)	0.3±0.1 (0.21-0.49)	0.3±0.1 (0.2-0.5)

[a] Data expressed at mean ± S. D.; the range is presented in parenthesis.

[b] Total DDT = Σ(p,p' DDE + o,p' DDT + p,p' DDD + p,p' DDT).

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