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SUPPLEMENTARY MATERIAL

Assessing the potential environmental factors affecting cladoceran assemblage composition in arsenic-contaminated lakes near abandoned silver mines

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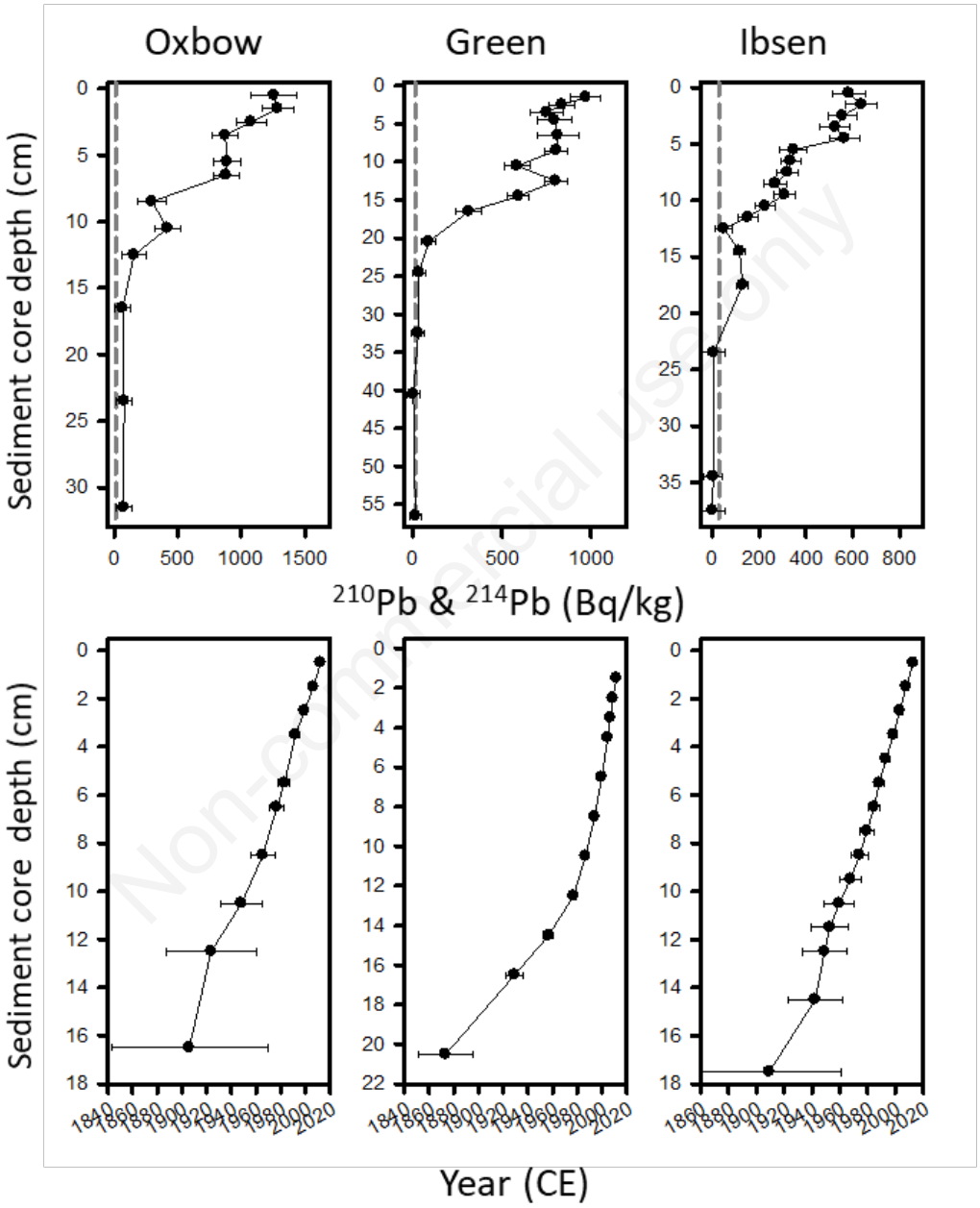
Supplementary Material 1. Selected limnological variables for the 22 lakes sampled around Cobalt, Ontario, Canada. The data presented here were point measurements taken in the summer of 2015.

	Latitude	Longitude	Coring depth	Surface area	Alkalinity	Total Dissolved Solids	Conductivity	pH
	decimal	decimal	m	ha	mg $CaCO_3$/L	mg/L	µS/cm	
	degrees	degrees						
Cart	47.38259	-79.6838	1.2	4.53	76	83.4	165	8.89
Tooth	47.18434	-79.509	17.2	39.5	28	34	68.1	7.66
Fourclaim	47.19714	-79.513	4.3	11.1	42	47.9	95	8.2
Cobalt	47.39039	-79.6877	10.4	18.4	129	186	366	8.34
Ibsen	47.35121	-79.6534	4.5	2.74	70	78.4	161	8.75
Brady	47.36064	-79.6483	2.4	5.74	100	112	220	8.7
Crosswise	47.3846	-79.6409	7.4	95.2	66	69.7	141	8.1
New	47.34464	-79.661	19.2	64.06	41	47.2	97.5	8
Kirk	47.36591	-79.627	11.9	26.9	66	70	141	8.06
Maidens	47.20121	-79.4831	9.4	30.88	28	48.8	105	7.84
Silver	47.33966	-79.6374	1.2	6.55	60	64	132	8.75
North Pickerel	47.36671	-79.7092	2.0	18.3	74	82.3	161	8.7
South Pickerel	47.36065	-79.7073	2.7	7.7	70	77.4	152	8.52
Green	47.38631	-79.7136	5.4	3.81	59	93.6	190	8.47
Clear	47.39429	-79.7129	15.2	21	68	126	253	8.05
IceChiesel	47.31163	-79.6887	15.2	5.98	5	2.6	5.29	4.7
Goodwin	47.32684	-79.5961	7.6	41.1	72	75.8	153	8.28
Mary Ann	47.33105	-79.6413	1.3	3.1	86	89.8	181	7.2
Frog	47.32765	-79.6535	12.8	4.97	58	63.6	129	6.9
Nicol	47.3445	-79.5983	2.1	41.82	65	66.5	135	9.17
Oxbow	47.17497	-79.4951	1.6	29.88	6	12.6	27	7.15
Pine	47.26776	-79.6255	12.8	102.18	43	54.6	116	8.13
Min	47.17497	-79.7136	1.22	2.74	5	2.6	5.29	4.7
Max	47.39429	-79.4831	19.20	102.18	129	186	366	9.17
Median	47.34457	-79.6448	6.37	18.35	65.5	69.85	141	8.165
Mean	47.32249	-79.6312	7.63	26.61	59.64	72.10	145.18	8.03

	Chloride	Sulphate	Calcium	Magnesium	Sodium	Potassium	Aluminum	Arsenic	Nickel
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L
Cart	0.5	6	21	6.91	1.8	0.9	20	972	5.3
Tooth	0.5	4	9.24	1.92	0.8	0.3	20	635	0.8
Fourclaim	0.5	4	14.5	2.09	0.9	0.7	20	542	3.6
Cobalt	22.1	10	49	9.22	17.4	1	70	495	10.2
Ibsen	0.5	3	24.9	6.24	2.3	0.2	70	142	7.8
Brady	0.6	7	35.2	6.87	0.9	0.6	20	140	2.1
Crosswise	0.5	3	20.7	5.06	0.8	0.3	40	82.4	2.5
New	0.5	3	13.9	3.81	0.7	0.2	30	36.8	2.9
Kirk	0.5	3	21.1	4.88	0.7	0.3	30	34	1.3
Maidens	10.6	4	11.5	4.25	2	0.3	20	23.6	1.3
Silver	0.5	2	19.3	5.32	0.8	0.3	50	7.3	1.5
North Pickerel	0.6	6	26.3	3.75	0.8	0.2	30	5	0.9
South Pickerel	0.6	5	24.4	3.58	0.7	0.2	40	3.3	0.8
Green	17.6	3	20.1	4.4	12.6	0.4	30	2.9	0.7
Clear	30.9	5	24.8	3.87	19.9	0.4	10	2	0.5
IceChiesel	0.5	1	0.36	0.12	0.2	0.3	20	1.7	0.5
Goodwin	0.5	3	23	5.47	0.7	0.2	20	1.4	1
Mary Ann	0.5	2	26.7	6.63	0.9	0.3	40	0.9	0.7
Frog	0.6	2	19.1	4.89	0.9	0.2	40	0.7	0.6
Nicol	0.5	1	19.8	5.04	0.6	0.3	60	0.7	7.4
Oxbow	0.5	3	3.52	0.91	0.8	0.2	70	0.7	0.5
Pine	0.5	3	18.7	4.21	2	0.3	70	0.4	0.7
Min	0.5	1	0.36	0.12	0.2	0.2	10	0.4	0.5
Max	30.9	10	49	9.22	19.9	1	70	972	10.2
Median	0.5	3	20.4	4.64	0.85	0.3	30	6.15	1.15
Mean	4.12	3.77	20.32	4.52	3.15	0.37	37.27	142.26	2.44

Supplementary Material 2. Radiometric dating profiles from three lakes and the list of bottom samples from all lakes.

Top panel - Radiometric dating analysis showing ^{210}Pb (black circles), and average ^{214}Pb (dashed grey vertical line) activities from selected sedimentary intervals (Becquerels per kilogram) plotted against core depth for Oxbow Lake, Green Lake and Ibsen Pond. Bottom panel – Estimated ^{210}Pb ages (using the Constant Rate of Supply model) with associated standard errors (using horizontal error bars) plotted against core depth for Oxbow Lake, Green Lake and Ibsen Pond.



List of bottom samples used for the study

Lake name	Bottom sample interval	Contamination status
Fourclaim	35 – 36 cm	Contaminated
Ibsen	39 – 40 cm	Migrated tailings
Brady	40 – 41 cm	Contaminated
Crosswise	33 – 34 cm	Contaminated
New Lake	56 – 57 cm	Migrated tailings
Maidens	40 – 41 cm	Migrated tailings
Silver	52 – 53 cm	Uncontaminated
North Pickeral	54 – 54.5 cm	Uncontaminated
South Pickeral	34 – 34.5 cm	Uncontaminated
Green	56 – 57 cm	Uncontaminated
Clear	39 – 40 cm	Uncontaminated
Goodwin	25 – 26 cm	Uncontaminated
Mary Ann	21 – 22 cm	Uncontaminated
Frog	20 – 21 cm	Uncontaminated
Nicol	55 – 56 cm	Uncontaminated
Oxbow	31 – 32 cm	Uncontaminated

Supplementary Material 3. Pearson correlation matrix of the environmental variables (transformations were applied to ensure normal distribution of variables) from the 21 lakes analyzed in the ordination analysis.

	Alkalinity	LogSulphate	SQRTCa	Magnesium	Log(x+1)Al	LogAs	SQRTTDS	SQRTConductivity	Log(x+1)Depth	LogSurfaceArea	pH
Alkalinity	1										
LogSulphate	0.379298	1									
SQRTCa	0.974345	0.39326	1								
Magnesium	0.872543	0.204601	0.836066	1							
Log(x+1)Al	0.048385	-0.34047	0.039009	0.175409	1						
LogAs	0.213811	0.562431	0.163786	0.227572	-0.26045	1					
SQRTTDS	0.92732	0.446083	0.949417	0.795666	-0.11273	0.172329	1				
SQRTConductivity	0.918878	0.429797	0.945499	0.802433	-0.10358	0.157253	0.999081	1			
Log(x+1)Depth	-0.14564	0.122094	-0.04367	-0.12997	-0.22533	0.099872	0.040042	0.051504	1		
LogSurfaceArea	-0.36241	-0.07904	-0.31969	-0.34574	0.017551	-0.10395	-0.32994	-0.32312	0.51287	1	
pH	0.407802	0.155565	0.431619	0.34415	0.006429	0.276834	0.390573	0.386528	-0.36039	-0.09614	1

LogSulphate – Log transformed sulphate; SQRTCa – Square root transformed calcium; Log(x+1)Al – Log (x+1) transformed aluminum; LogAs – Log transformed arsenic; SQRTTDS – Square root transformed total dissolved solids; SQRTConductivity – Square root transformed conductivity; Log(x+1)Depth – Log (x+1) transformed depth; LogSurfaceArea – Log transformed surface. area

Supplementary Material 4. Mean annual air temperature data for Earlton, Ontario (Climate Station ID: 6072230). Data retrieved from Adjusted and Homogenized Canadian Climate Data (https://climate.weather.gc.ca/). The record was mostly continuous, however, data from 1947 and 1952 were missing.