

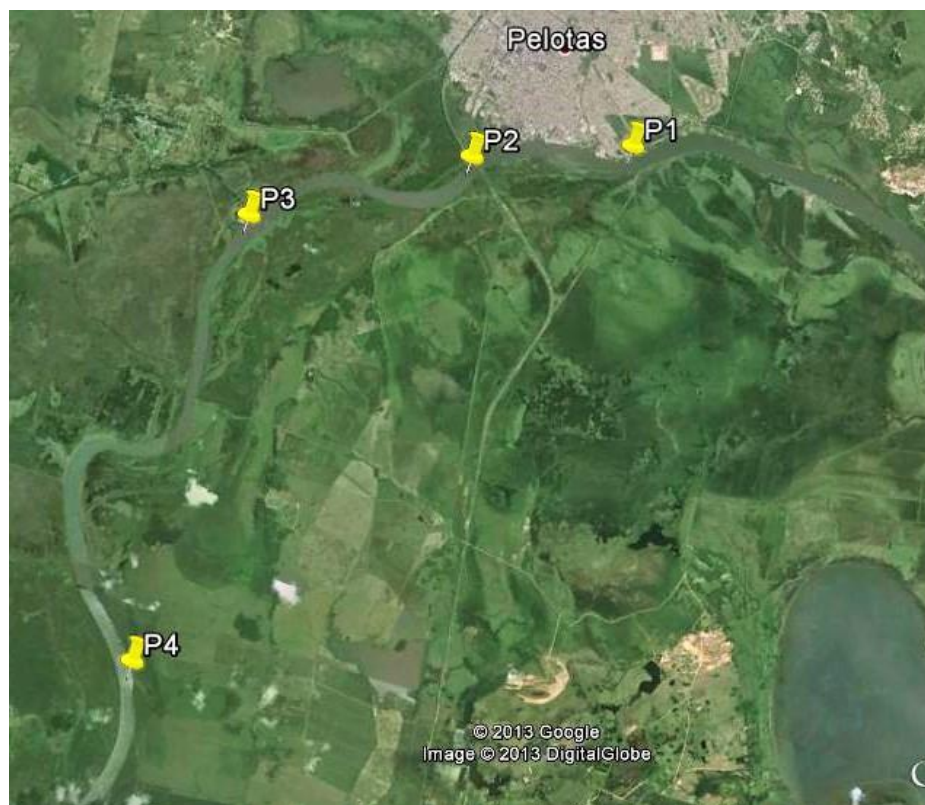
## Supplementary Information

### Evaluation of the Concentration of Cu, Zn, Pb and Cr in Different Fish Species from the São Gonçalo Channel in Pelotas-RS, Brazil

Marcelo M. Alves,<sup>a,b</sup> Aline L. Medina,<sup>a</sup> Ane Martiele T. Pinto,<sup>a</sup> Ana Clara N. Antunes,<sup>a</sup> Pedro José Sanches Filho,<sup>b</sup> Anderson S. Ribeiro<sup>a</sup> and Mariana A. Vieira<sup>\*a</sup>

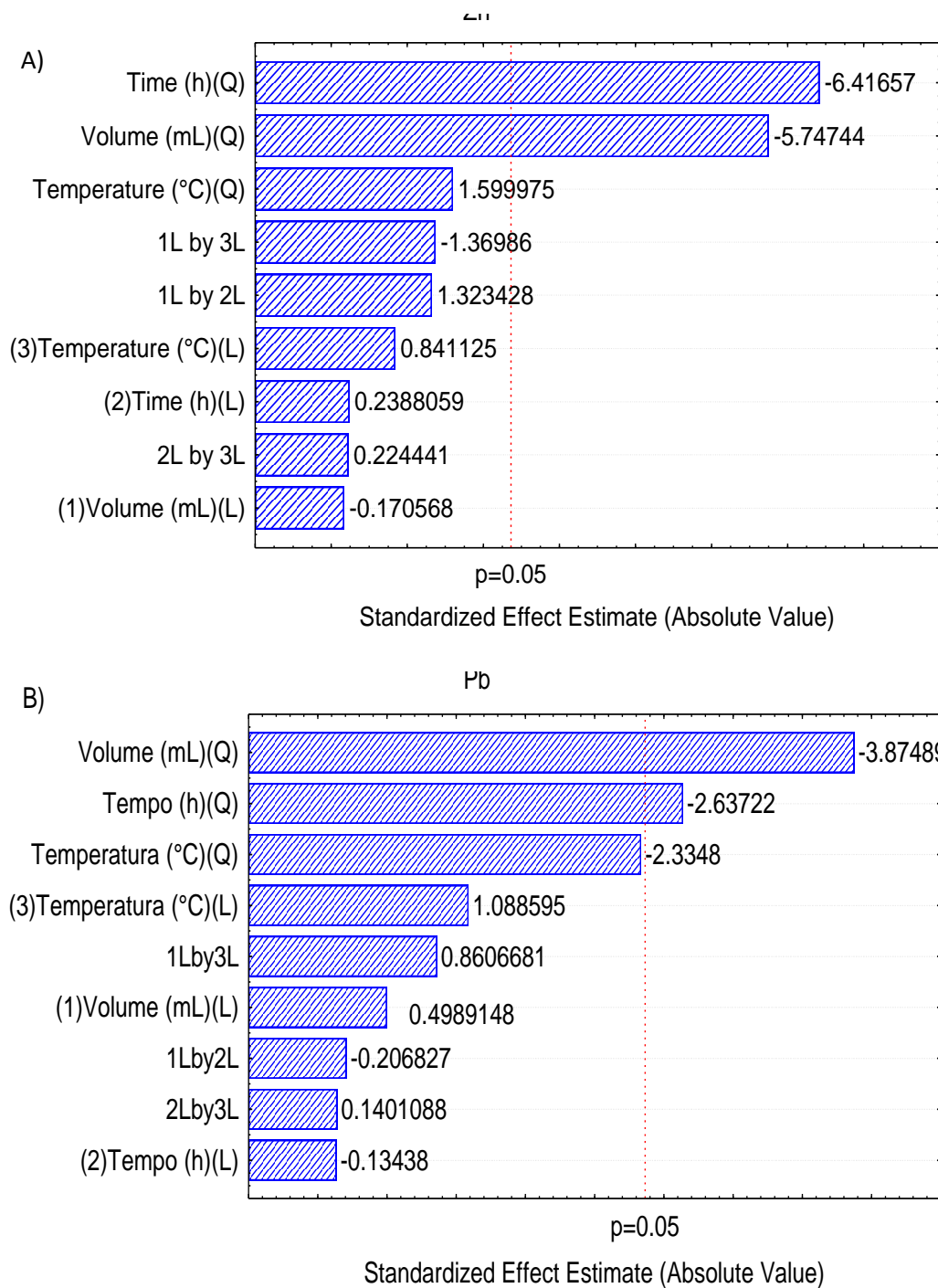
<sup>a</sup>Programa de Pós-Graduação em Química, Laboratório de Metrologia Química (LabMeQui), Universidade Federal de Pelotas (UFPel), 96010-900 Capão do Leão-RS, Brazil

<sup>b</sup>Grupo de Pesquisa em Contaminantes Ambientais (GPCA), Instituto Federal Sul-Rio-Grandense, 96015-560 Pelotas-RS, Brazil

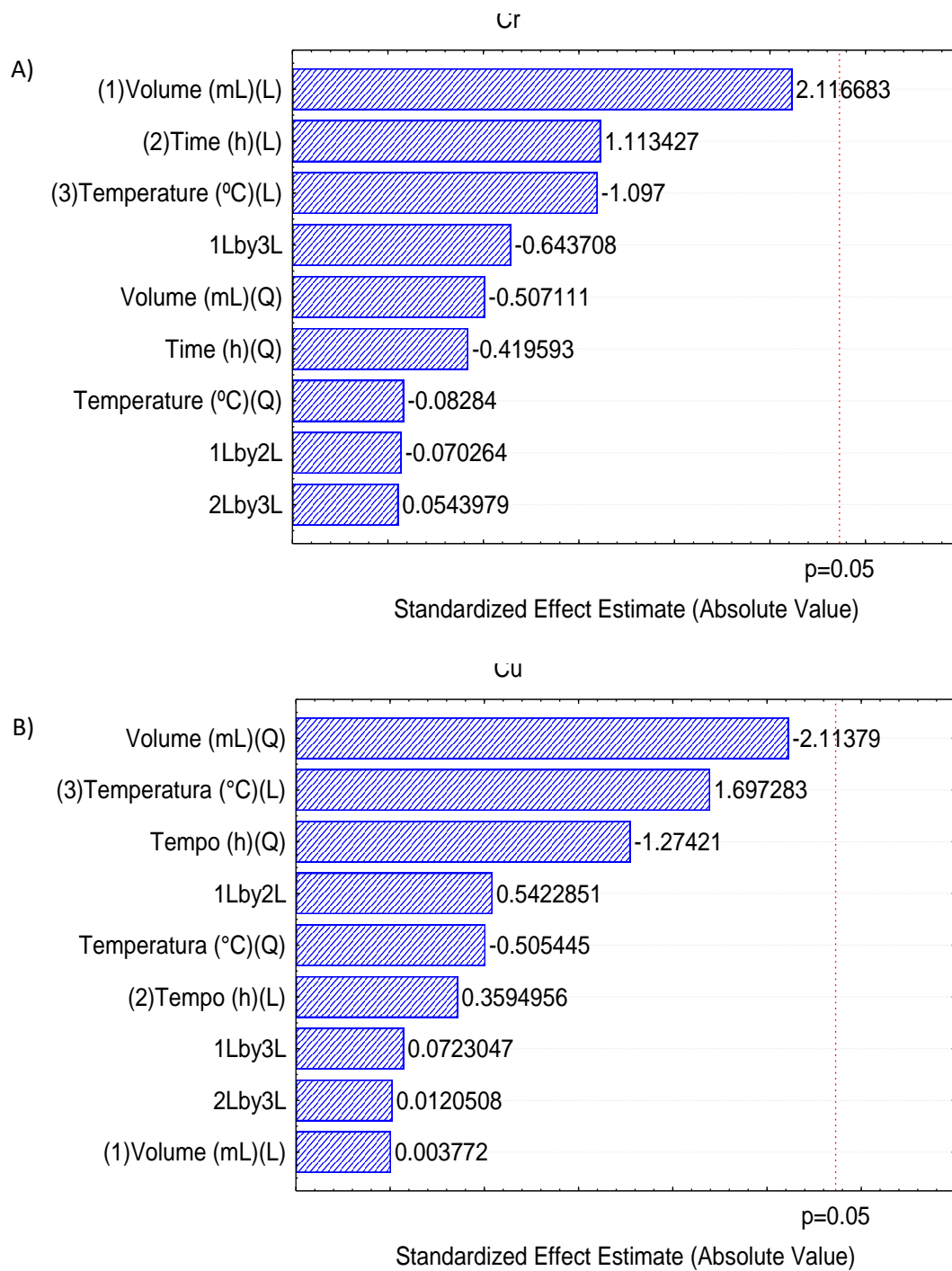


**Figure S1.** Collection points on São Gonçalo channel in Pelotas. Source: Google Earth.

\*e-mail: marianavieira@pq.cnpq.br



**Figure S2.** Pareto chart obtained by central composite design for the optimization of the variables for (A) Zn and (B) Pb determinations in fish samples.



**Figure S3.** Pareto chart obtained by central composite design for the optimization of the variables for (A) Cr and (B) Cu determinations in fish samples.

**Table S1.** Temperature program of the graphite furnace for the determination of Pb and Cr in fish tissue samples

Step	Temperature / °C	Ramp / s	Hold / s	Argon flow rate / (mL min <sup>-1</sup> )
Drying	110	10	30	250
Drying	130	10	30	250
Pyrolysis	1500 <sup>a</sup> ; 1000 <sup>b</sup>	10	20	250
Atomization	2300 <sup>a</sup> ; 1800 <sup>b</sup>	0	5	–
Cleaning	2600 <sup>a</sup> ; 2200 <sup>b</sup>	1	3	250

<sup>a</sup>Cr; <sup>b</sup>Pb.

**Table S2.** Factors and their respective levels in the central composite design

Factor	Levels				
	-1.68	-1	0	+1	+1.68
H <sub>2</sub> O <sub>2</sub> volume / mL	0.32	1	2	3	3.68
Decomposition time / h	0.32	1	2	3	3.68
Temperature of digester block / °C	100	120	150	180	200

**Table S3.** CCD matrix of the acid decomposition with reflux system for Cu, Zn, Cr and Pb in fish sample (n = 3)

Trial	Independent variable			Dependent variable			
	H <sub>2</sub> O <sub>2</sub> volume / mL	Decomposition time / h	Temperature / °C	Absorbance			
				Cu	Zn	Cr	Pb
1	1	1	120	0.096	0.168	0.1845	0.0861
2	3	1	120	0.093	0.168	0.2565	0.0801
3	1	3	120	0.095	0.159	0.1936	0.0896
4	3	3	120	0.097	0.167	0.2499	0.0865
5	1	1	180	0.103	0.176	0.1742	0.0871
6	3	1	180	0.100	0.164	0.2052	0.1000
7	1	3	180	0.102	0.167	0.1731	0.0987
8	3	3	180	0.104	0.167	0.2136	0.1025
9	0.32	2	150	0.103	0.155	0.1559	0.0920
10	3.68	2	150	0.104	0.156	0.1822	0.0991
11	2	0.32	150	0.107	0.146	0.1361	0.1153
12	2	3.68	150	0.110	0.159	0.2066	0.0979
13	2	2	100	0.109	0.186	0.1826	0.1103
14	2	2	200	0.117	0.188	0.1778	0.1083
15	2	2	150	0.111	0.187	0.2093	0.1233
16	2	2	150	0.109	0.180	0.1995	0.1231
17	2	2	150	0.109	0.179	0.2036	0.1227

**Table S4.** Regression coefficient for Zn

	Regression coefficient	Error	t(7)	p-Value
Average	0.181722	0.003	62.13	< 0.0001
(1) Volume (L) / mL	-0.000234	0.001	-0.17	0.8693
Volume (Q) / mL	-0.008689	0.001	-5.78	0.0007
(2) time (L) <sup>a</sup> / h	0.000328	0.001	0.24	0.8181
time (Q) <sup>a</sup> / h	-0.009700	0.001	-6.42	0.0004
(3) Temperature (L) <sup>b</sup> / °C	0.001155	0.001	0.84	0.4281
Temperature (Q) <sup>b</sup> / °C	0.002419	0.001	1.59	0.1536
1L, 2L	0.002375	0.002	1.32	0.2273
1L, 3L	0.002458	0.002	-1.37	0.2130
2L, 3L	0.000403	0.002	0.22	0.8288

<sup>a</sup>Decomposition time; <sup>b</sup>temperature of digester block.

**Table S5.** Regression coefficient for Pb

	Regression coefficient	Error	t(7)	p-Value
Average	0.123763	0.006	20.26	< 0.0001
(1) Volume (L) / mL	0.001431	0.003	0.49	0.6331
Volume (Q) / mL	-0.012231	0.003	-3.87	0.0061
(2) time (L) <sup>a</sup> / h	-0.000385	0.003	-0.13	0.8968
time (Q) <sup>a</sup> / h	-0.008324	0.003	-2.64	0.0335
(3) Temperature (L) <sup>b</sup> / °C	0.003122	0.003	1.09	0.3124
Temperature (Q) <sup>b</sup> / °C	-0.007370	0.003	-2.33	0.0522
1L, 2L	-0.000775	0.004	-0.21	0.8420
1L, 3L	0.003225	0.004	0.86	0.4179
2L, 3L	0.000525	0.004	0.14	0.8925

<sup>a</sup>Decomposition time; <sup>b</sup>temperature of digester block.