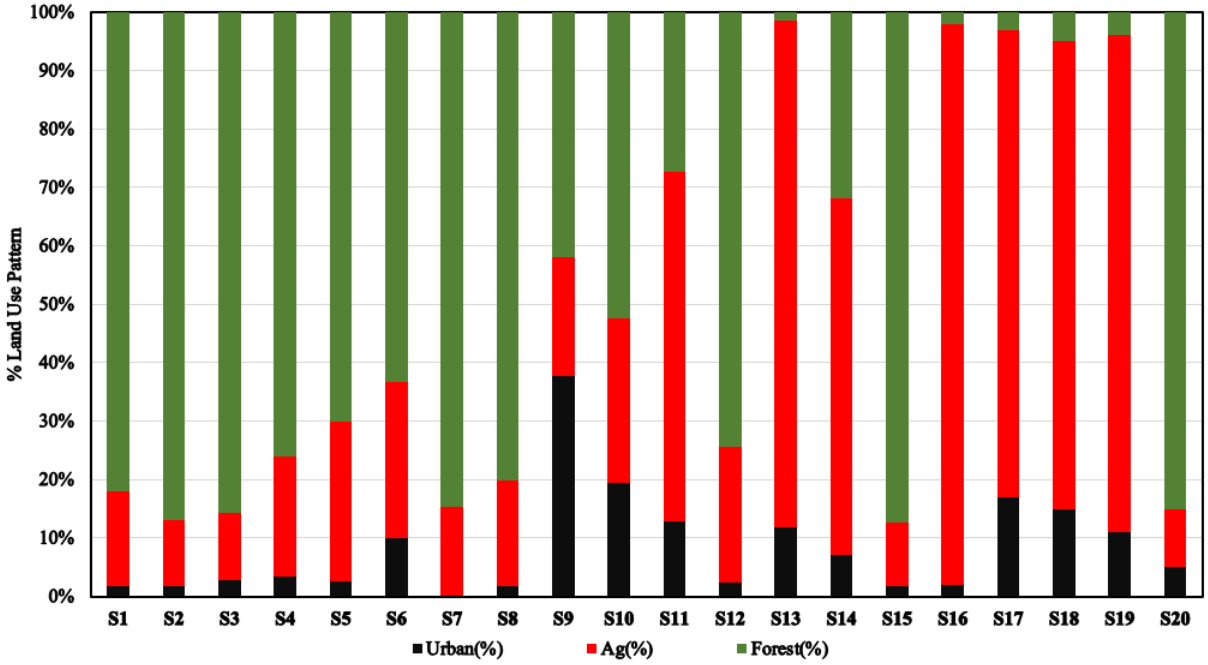
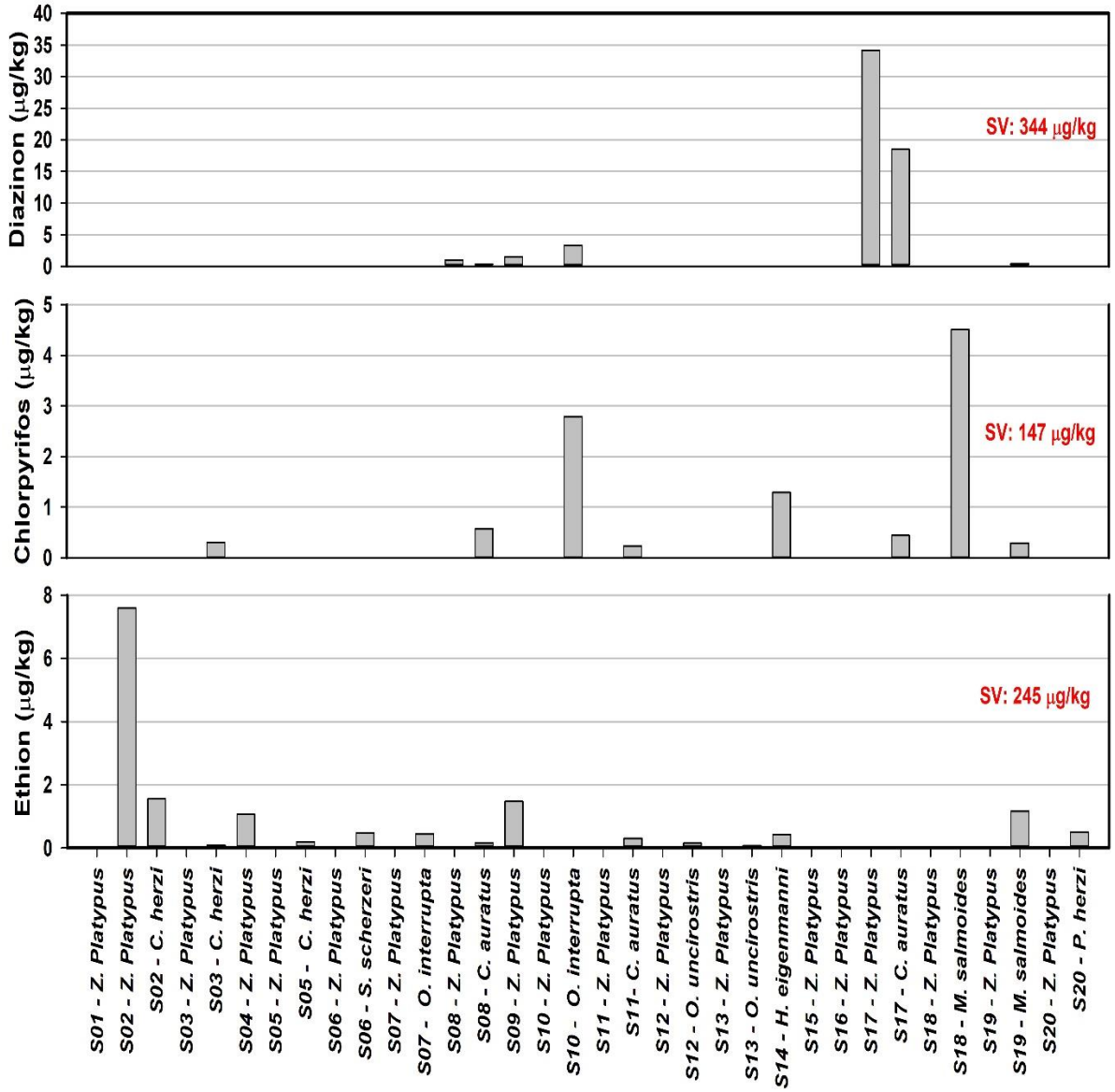
Supplementary Material

Research article

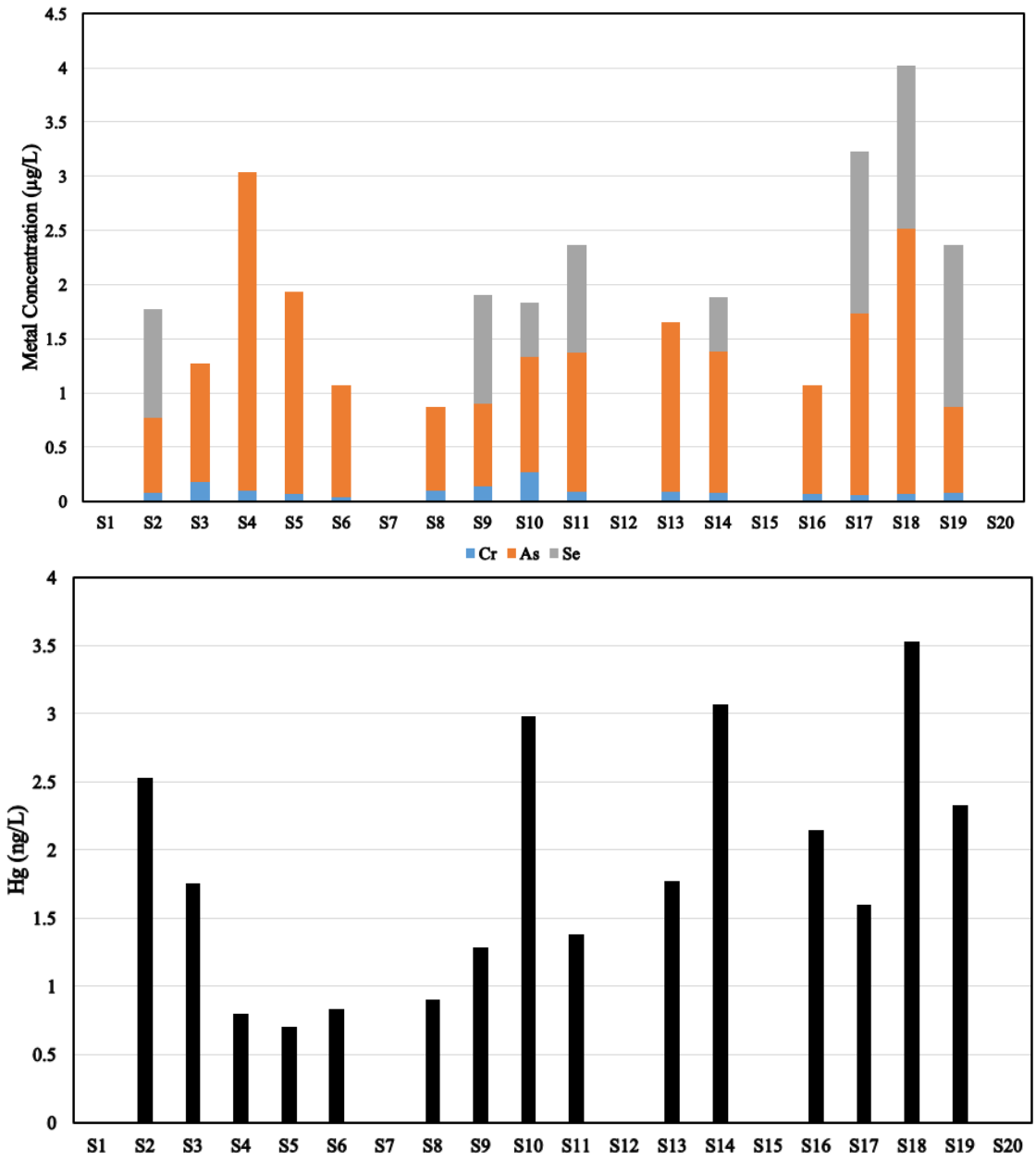
Fish tissue contamination with organic pollutants and heavy metals: Link between land use and ecological health



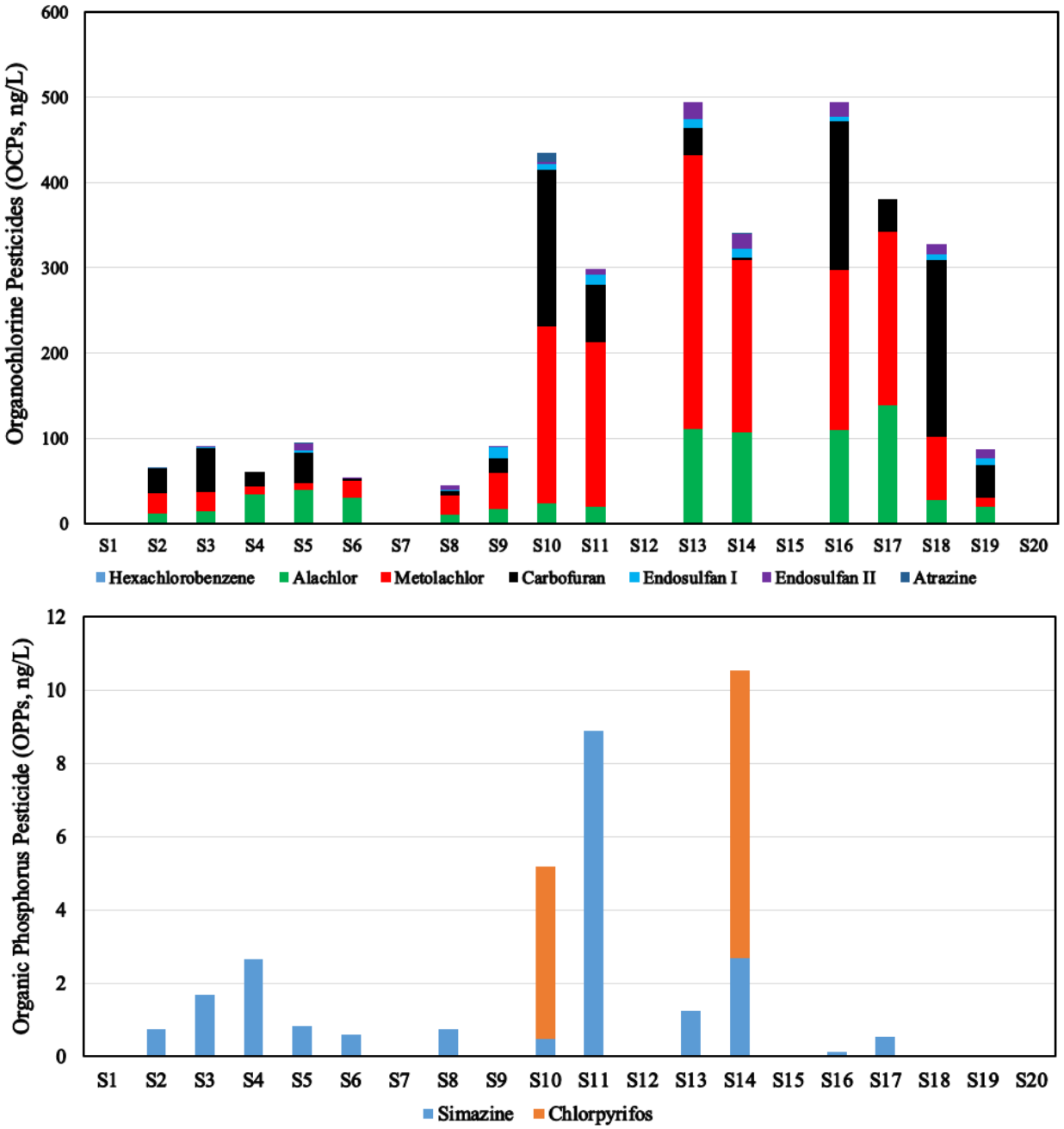
Supplementary Figure S1. Variations in land use pattern in different sites of Geum River during the study period



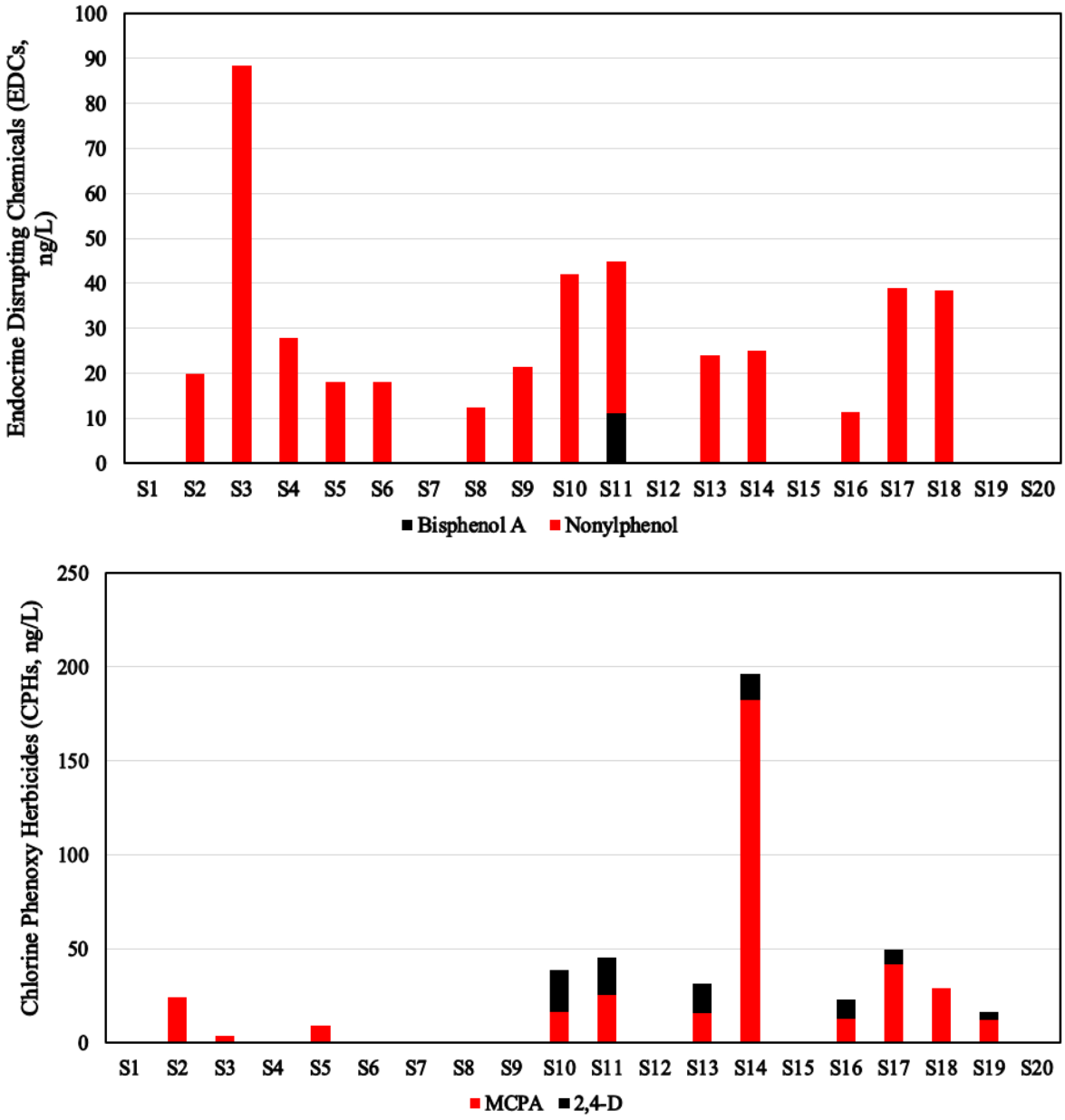
Supplementary Figure S2. Organic phosphorus pesticides (OPPs) at different sites in different fish species (SV: screen value)



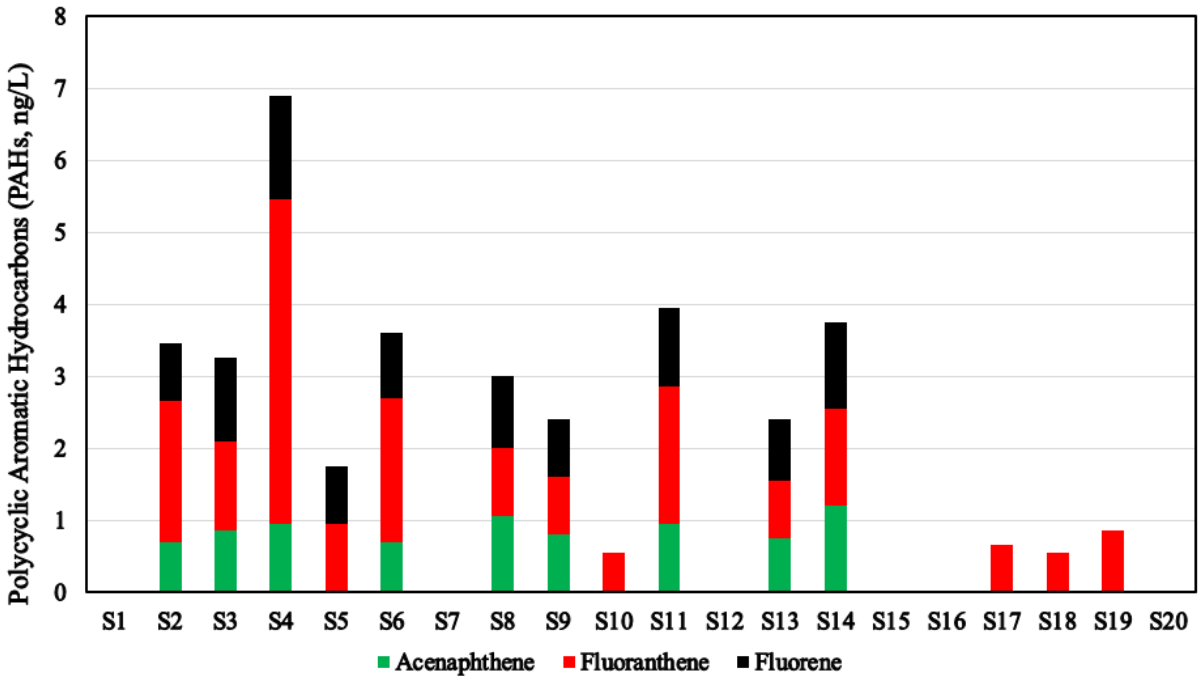
Supplementary Figure S3. Variations in metal concentration of surface water in different sites of Geum River



Supplementary Figure S4. Variations in organochlorine and organic phosphorus pesticides of surface water in different sites of Geum River



Supplementary Figure S5. Variations in endocrine disrupting chemicals and chlorine phenoxy herbicides of surface water in different sites of Geum River



Supplementary Figure S6. Variations in polycyclic aromatic hydrocarbons of surface water in different sites of Geum River

Supplementary Table S1. Conditions for the GC analysis of organic phosphorous and organic chlorine pesticides, oxyfluorfen, and PAHs.

	Conditions	
GC	. Column	. HP-5MS (60 m×0.25 ㎜×0.25 ㎛)
	. Carrier gas	. He (99.999%)
	. Injection port temp.	. 310℃
	. Injection mode	. pulsed splitless , 1㎕ injection
	. Oven temp. programming	20℃/min 5℃/min . 70℃ (1min) → 180℃(2min) → 310℃(10min)

Supplementary Table S2. Conditions for PCB GC-ECD analysis.

	Conditions	
GC	. Column	. HP-5MS (30 m×0.25 ㎜×0.25 ㎛)
	. Carrier gas	. N2 (99.999%)
	. Injection port temp.	. 260℃
	. Injection mode	. pulsed splitless , 1㎕ injection
	. Oven temp. programming	15℃/min 5℃/min . 70℃ (2min) → 120℃ → 300℃(10min)
ECD	. Interface temp	. 300℃

Supplementary Table S3. ICP/MS specifications for metal analysis

Parameters	Conditions
Plasma/RF	
- Forward power (W)	1550
- Interface Temp. (℃)	35.06
- Cooling Water Flow (L/min)	3.82
Cool Gas Flow (L/min)	13.978
Auxilliary Gas Flow (L/min)	0.7918
Nebulizer Gas Flow (L/min)	0.8575
Pump Speed (rpm)	40

Supplementary Table S4: Fish species name with tolerance and trophic guilds (TS: tolerant spcies, IS: intermediate species, SS: sensitive species, O: omnivores, I: insectivores, C: carnivores, and H: herbivores)

Fish name	Tolerance Guild	Tropgic Guild
Abbottina rivularis	TS	O
Acanthorhodeus chankaensis	IS	O
Acheilognathus koreensis	IS	O
Acheilognathus lanceolata	IS	O
Acheilognathus macropterus	IS	O
Acheilognathus rhombeus	IS	O
Acheilognathus yamatsutae	IS	O
Carassius auratus	TS	O
Carassius cuvieri	TS	O
Channa argus	TS	C
Cobitis choii	SS	I
Cobitis nalbanti	IS	I
Coreoleuciscus splendidus	SS	I
Coreoperca herzi	SS	C
Cyprinus carpio	TS	O

Erythroculter erythropterus	TS	C
Gnathopogon strigatus	IS	I
Gobiobotia brevibarba	SS	I
Gobiobotia macrocephala	SS	I
Gobiobotia nakdongensis	SS	I
Hemibarbus labeo	TS	I
Hemibarbus longirostris	IS	I
Hemiculter eigenmanni	TS	O
Hypomesus nipponensis	IS	I
Iksookimia koreensis	IS	I
Leiocassis ussuriensis	IS	I
Lepomis macrochirus	TS	I
Liobagrus mediadiposalis	SS	I
Liobagrus obesus	SS	I
Macropodus ocellatus	TS	I
Microphysogobio jeoni	IS	I
Microphysogobio yaluensis	IS	O
Micropterus salmoides	TS	C
Misgurnus anguillicaudatus	TS	O
Misgurnus mizolepis	TS	O
Mugil cephalus	TS	H
Odontobutis interrupta	IS	C
Odontobutis platycephala	SS	C
Opsariichthys uncirostris amurensis	TS	C
Oryzias latipes	TS	O
Oryzias sinensis	TS	O
Plecoglossus altivelis	IS	H
Pseudobagrus fulvidraco	TS	I
Pseudobagrus koreanus	SS	I
Pseudogobio esocinus	IS	I
Pseudopungtungia nigra	SS	I
Pseudorasbora parva	TS	O
Pungtungia herzi	IS	I
Rhinogobius brunneus	IS	I
Rhinogobius giurinus	TS	O
Rhodeus notatus	IS	O
Rhodeus ocellatus	IS	O
Rhodeus uyekii	IS	C
Rhynchocypris oxycephalus	SS	I
Sarcocheilichthys nigripinnis	IS	I
Sarcocheilichthys variegatus	SS	I

Silurus asotus	TS	C
Siniperca scherzeri	SS	C
Squalidus chankaensis tsuchigae	IS	O
Squalidus gracilis majimae	SS	I
Squalidus japonicus coreanus	TS	O
Squaliobarbus curriculus	IS	O
Tridentiger brevispinis	IS	I
Tridentiger obscurus	TS	I
Zacco koreanus	SS	I
Zacco platypus	TS	O
Zacco temminckii	SS	I

Supplementary Table S5. Metal Concentration at different sites of the whole body of *Zacco platypus.* (Cr: Chromium, Cu: Copper, Zn: Zinc, As: Arsenic, Se: Selenium, Cd: Cadmium, Hg: Mercury, Pb: Lead)

Fish name	Sites	Cr	Cu	Zn	As	Se	Cd	Hg	Pb
Zacco platypus	S1	2.08	1.79	70.48	0.17	0.33	0.03	0.03	0.14
	S2	0.88	1.41	33.44	0.18	0.26	0.02	0.03	0.07
	S3	2.53	1.41	35.20	0.22	0.23	0.15	0.02	0.45
	S4	0.26	0.92	25.02	0.44	0.09	0.02	0.01	0.07
	S5	0.56	1.05	29.02	0.32	0.11	0.01	0.02	0.19
	S6	1.32	1.74	39.75	0.73	0.32	0.04	0.02	1.47
	S7	5.03	1.50	58.71	0.34	0.40	0.03	0.03	0.11
	S8	0.31	1.57	32.59	0.37	0.36	0.01	0.01	0.41
	S9	8.30	3.72	50.74	0.21	0.37	0.06	0.02	0.84
	S10	2.83	1.54	45.87	0.32	0.28	0.02	0.02	0.40
	S11	6.83	3.61	50.92	0.39	0.35	0.03	0.11	1.27
	S12	4.27	2.30	52.24	3.89	0.36	0.18	0.02	2.54
	S13	10.00	2.25	56.08	0.72	0.37	0.08	0.01	1.70
	S15	3.31	1.10	41.57	0.41	0.37	0.01	0.01	0.21
	S16	8.01	1.78	39.66	0.82	0.34	0.04	0.03	0.91
	S17	1.77	1.18	30.70	0.18	0.37	0.01	0.01	0.08
	S18	6.58	1.52	42.94	0.40	0.36	0.02	0.02	0.25
	S19	10.16	1.20	29.67	0.17	0.19	0.01	0.02	0.07
	S20	4.11	1.58	35.13	0.10	0.29	0.08	0.04	0.09