Figure S1. Net relative changes (%) in water quality conditions in the fish holding tank from when river water was initially added to the tank (S) until fish necropsy (20–24 h later). Each bar indicates an individual sampling event to collect fish and water. (A) Temperature. (B) Salinity. (C) Dissolved oxygen (DO).
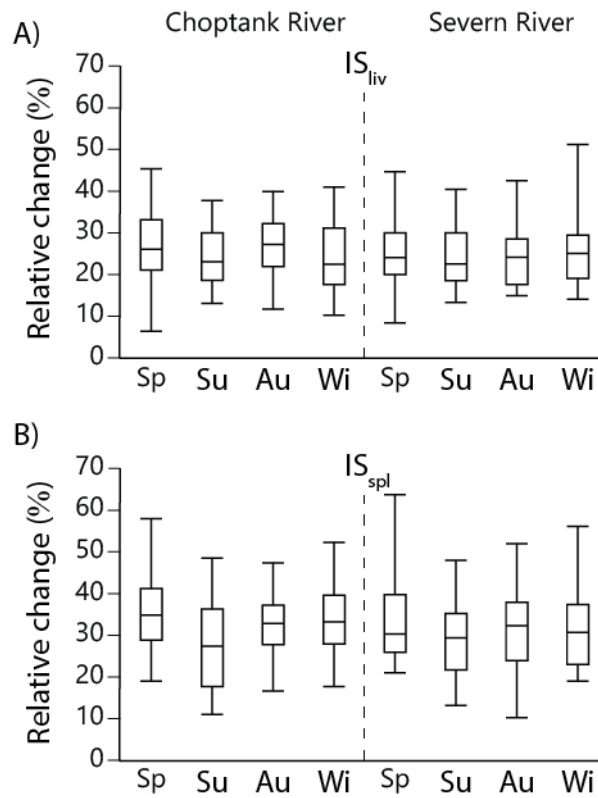
Figure S2. Relative decrease (%) in organ volume following histological processing. (A) Liver (IS_{liv}). (B) Spleen (IS_{spl}). Boxes indicate 75th quantile (top line), median (middle line), and 25th quantile (bottom line), while whiskers indicate extreme values. Variance in IS_{liv} and IS_{spl} by river, season, and sex were not significant (p > 0.05).
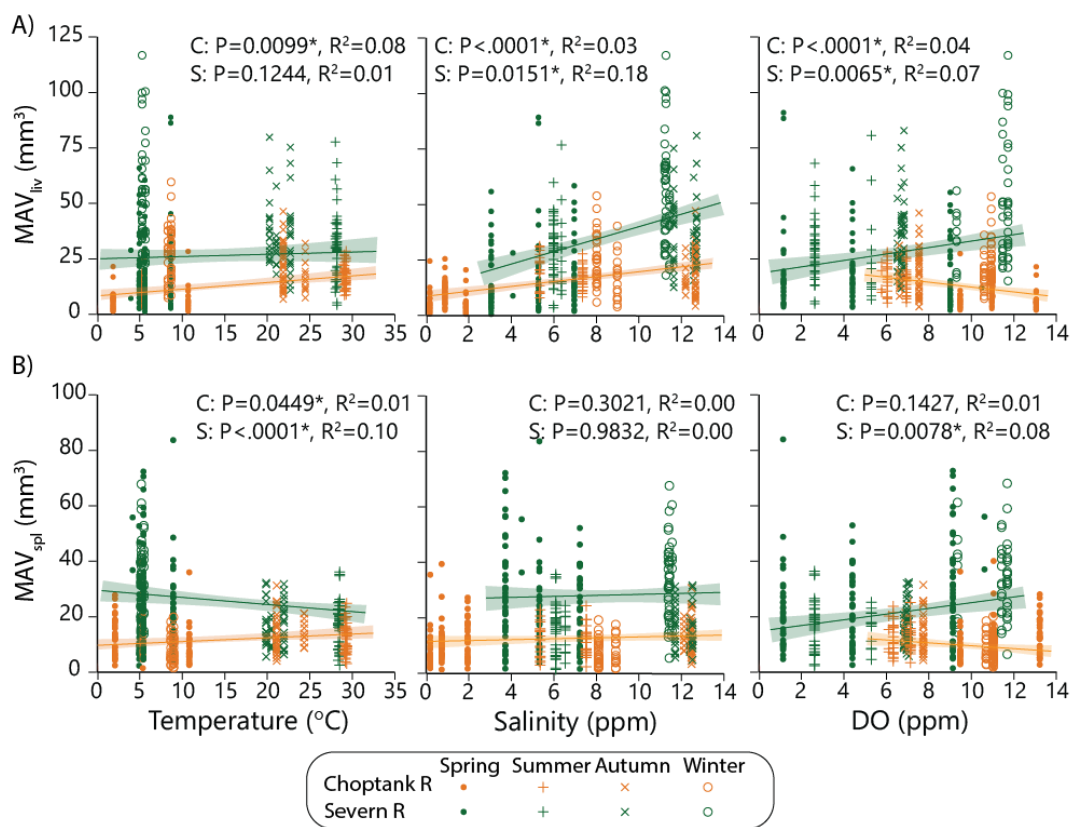
Figure S3. Linear regression fits of macrophage aggregates (MA) to environmental variables. A) Total volume of MA in the liver (MAV$_{liv}$). B) Total volume of MA in the spleen (MAV$_{spl}$) of white perch *Morone americana* in the Choptank (C) and Severn (S) Rivers, 2019-2020. Shaded area around each line indicates the 95% CI. P-values followed by an asterisk (*) indicates a slope significantly different from 0.

Table S1. Water quality conditions (means ± SD) at the fish capture sites, 2019-2020. Means followed by a different superscript letter are significantly different ($p < 0.05$). Outcomes indicate results of least squares regression models. Significant outcomes are marked by an asterisk (*).

Season	River	Temperature (°C)	Dissolved oxygen (ppm)	Salinity (ppt)
Spring	Choptank	6.6 ± 3.5 [D]	10.1 ± 0.8 [A]	1.0 ± 0.5 [F]
	Severn	6.2 ± 2.0 [D]	7.8 ± 1.1 [B]	5.3 ± 2.1 [E]
Summer	Choptank	29.4 ± 0.9 [A]	6.6 ± 0.4 [B]	6.7 ± 1.0 [D]
	Severn	28.6 ± 0.1 [A]	3.3 ± 1.1 [C]	6.3 ± 0.2 [D]
Autumn	Choptank	22.1 ± 1.5 [B]	7.4 ± 0.4 [B]	12.3 ± 0.1 [A]
	Severn	21.0 ± 0.9 [B]	6.8 ± 0.1 [B]	12.1 ± 0.4 [A]
Winter	Choptank	8.4 ± 0.1 [C]	10.9 ± 0.2 [A]	8.4 ± 0.4 [C]
	Severn	5.2 ± 0.4 [D]	11.1 ± 0.9 [A]	11.4 ± 0.1 [B]
	Outcome			
	River	0.0006*	<0.0001*	<0.0001*
	Season	<0.0001*	<0.0001*	<0.0001*

Table S2. Parameters evaluated in least squares or ordinal logistic regression models for volume of liver (SV_{liv}) and spleen (SV_{spl}), total volumes of macrophage aggregates in the liver (MAV_{liv}) and spleen (MAV_{spl}), and relative hemosiderin content in the liver (H_{liv}) and spleen (H_{spl}) of white perch *Morone americana*, 2019–2020. For a description of lesions and parasites see Matsche et al. (2020) and (Matsche et al. 2023).

SV_{liv}, MAV_{liv}, H_{liv}	SV_{spl}, MAV_{spl}, H_{spl}
River	River
Sex	Sex
Age	Age
Fish condition, K	K
Hepatosomatic index, HSI	Splenosomatic index, SSI
Gonadosomatic index, GSI	GSI
Temperature	Temperature
Salinity	Salinity
Dissolved oxygen, DO	DO
Polycyclic aromatic hydrocarbon metabolites, Total PAH	Total PAH
Copper granule accumulation, C_{liv}	Trematode infections
Goussia bayae infections	Granulomas
Myxidium murchelanoi infections	
Trematode infections	
Granulomas	
Inflammation	
Degenerative biliary lesions	
Degenerative hepatocellular lesions	
Proliferative biliary lesions	
Proliferative hepatocellular lesions	

Table S3. Multivariate analysis of organ volumes, total volumes of macrophage aggregates, fish biometrics, total PAH bile metabolites, and environmental variables. Correlation coefficients (A) and p-values (B) denoted in colored text indicate significant associations ($p < 0.05$). Red values indicate strong associations ($r \geq 0.6$), yellow values indicate moderate associations ($0.4 \leq r < 0.6$), green values indicate weak associations ($0.2 < r < 0.4$), and blue values indicate very weak associations ($r \leq 0.2$). Abbreviated terms are defined in Table S1.

	SV_{liv}	SV_{spl}	MAV_{liv}	MAV_{spl}	K	HSI	SSI	GSI	Temp.	Salinity	DO	Total PAH	C_{liv}
A) Pearson correlation coefficients													
SV_{liv}		0.7233	0.1745	0.4813	0.0694	0.3281	0.3915	0.7317	−0.5375	−0.2837	0.0243	0.0527	−0.0166
SV_{spl}	0.7233		0.2391	0.5002	0.0939	0.1225	0.6856	0.5822	−0.5504	−0.1136	0.2010	0.0118	−0.0116
MAV_{liv}	0.1745	0.2391		0.5610	−0.0472	−0.2340	0.0000	−0.1652	0.1035	0.4695	−0.0175	−0.0898	0.6166
MAV_{spl}	0.4813	0.5002	0.5610		−0.0965	−0.1461	0.1958	0.1519	−0.1955	0.1399	−0.0433	0.0230	0.3244
K	0.0694	0.0939	−0.0472	−0.0965		−0.2230	−0.0401	−0.0483	0.0531	−0.2454	−0.0267	0.0583	−0.0998
HSI	0.3281	0.1225	−0.2340	−0.1461	−0.2230		0.4015	0.5614	−0.5446	−0.3749	0.2355	−0.0345	−0.1940
SSI	0.3915	0.6856	0.0000	0.1958	−0.0401	0.4015		0.4308	−0.6466	−0.1607	0.3489	−0.0949	−0.1367
GSI	0.7317	0.5822	−0.1652	0.1519	−0.0483	0.5614	0.4308		−0.7016	−0.4417	0.0157	−0.0035	0.0353
Temperature	−0.5375	−0.5504	0.1035	−0.1955	0.0531	−0.5446	−0.6466	−0.7016		0.3730	−0.4943	0.1052	0.0063
Salinity	−0.2837	−0.1136	0.4695	0.1399	−0.2454	−0.3749	−0.1607	−0.4417	0.3730		−0.1803	−0.1816	0.2509
DO	0.0243	0.2010	−0.0175	−0.0433	−0.0267	0.2355	0.3489	0.0157	−0.4943	−0.1803		−0.5829	0.0002
T PAH	0.0527	0.0118	−0.0898	0.023	0.0583	−0.0345	−0.0949	−0.0035	0.1052	−0.1816	−0.5829		−0.0425
C_{liv}	−0.0166	−0.0116	0.6166	0.3244	−0.0998	−0.1940	−0.1367	0.0353	0.0063	0.2509	0.0002	−0.0425	
B) P values													
SV_{liv}		<0.0001	<0.0001	<0.0001	0.1022	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.5708	0.2736	0.8273
SV_{spl}	<0.0001		<0.0001	<0.0001	0.0271	0.0039	<0.0001	<0.0001	<0.0001	<0.0001	0.0079	0.8174	0.8786
MAV_{liv}	<0.0001	<0.0001		<0.0001	0.2668	<0.0001	0.9998	<0.0001	0.0156	<0.0001	0.6827	0.0790	<0.0001
MAV_{spl}	<0.0001	<0.0001	<0.0001		0.0232	0.0006	<0.0001	0.0003	<0.0001	0.0011	0.3133	0.6539	<0.0001
K	0.1022	0.0271	0.2668	0.0232		<0.0001	0.3458	0.2563	0.2162	<0.0001	0.5345	0.2544	0.1889
HSI	<0.0001	0.0039	<0.0001	0.0006	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.5002	0.0001
SSI	<0.0001	<0.0001	0.9998	<0.0001	0.3458	<0.0001		<0.0001	<0.0001	0.0002	<0.0001	0.0748	0.0713
GSI	<0.0001	<0.0001	<0.0001	0.0003	0.2563	<0.0001	<0.0001		<0.0001	<0.0001	0.7152	0.9447	0.6429
Temperature	<0.0001	<0.0001	0.0156	<0.0001	0.2162	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	0.0394	0.9339
Salinity	<0.0001	0.0079	<0.0001	0.0011	<0.0001	<0.0001	0.0002	<0.0001	<0.0001		<0.0001	0.0003	0.0008
DO	0.5708	<0.0001	0.6827	0.3133	0.5345	<0.0001	<0.0001	0.7152	<0.0001	<0.0001		<0.0001	0.9979
T PAH	0.2736	0.8174	0.0790	0.6539	0.2544	0.5002	0.0748	0.9447	0.0394	0.0003	<0.0001		0.5766
C_{liv}	0.8273	0.8786	<0.0001	<0.0001	0.1889	0.0001	0.0713	0.6429	0.9339	0.0008	0.9979	0.5766	

LITERATURE CITED

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