

SUPPLEMENTARY MATERIAL FOR:

Dissolved Calcium in Kentucky Lake Watershed: Sources, Trends and Possible Implications for Zebra Mussel Colonization

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Table S1.

Table S1. Details of sampling sites used for monitoring dissolved calcium in water samples.

Station	Name	Location	Latitude	Longitude	Avg. Depth (m)
1N	Panther Creek 1	Within Panther Creek embayment	36.5209	-88.0094	0
2L	Ledbetter 2	Within Ledbetter Creek embayment	36.7503	-88.1405	4.61
2N	Panther Creek 2		36.5112	-87.9886	0
5L	Ledbetter 5	50m downstream from KY HWY 94 bridge	36.7332	-88.1507	0
CB	Blood River Light	Old river channel of KY Lake	36.6388	-88.0573	17.02
CH	Highland Light	Old river channel of KY Lake	36.7397	-88.1086	16.21
CW	Widow Reynolds Light	Old river channel of KY Lake	36.8239	-88.1371	17.45
ET	Turkey Bay	East side of KY Lake	36.7357	-88.0917	6.13
UA	Upper Anderson	Within Anderson	36.7207	-88.1177	4.10

		Creek embayment			
UB	Upper Blood River	Within Blood River embayment	36.6346	-88.1149	4.77
UT	Turkey Bay	Upper Turkey Bay	36.7411	-88.0889	3.00
WA	Anderson Bay	West side of KY Lake	36.7219	-88.1103	5.90
WB	Blood River	West Side of KY Lake	36.6426	-88.0769	10.22
WJ	Jonathan Creek	West side of KY Lake	36.8126	-88.1550	7.91
WL	Ledbetter Creek	West side of KY Lake	36.7575	-88.1287	7.73

Table S2a. Dissolved calcium concentrations (mg/L) in water samples collected from Panther Creek (1N, 2N) and Ledbetter (2L and 5L) sites during the years 2018 to 2020.

Site	2018												Yr.	Stdev
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg.	n=12
1N	25.6	34.0	33.6	35.4	26.0	NA	NA	30.8	15.6	18.7	22.2	22.1	26.4	6.50
2N	14.5	36.8	43.3	33.7	49.7	5.0	15.4	51.4	28.4	0.6	29.9	27.4	28.0	15.8
2L	29.4	38.2	19.2	40.4	24.7	20.2	14.7	16	13.7	17.5	20.1	21.1	22.9	8.40
5L	<0.2	13.4	17.3	<0.2	<0.2	<0.2	3.7	<0.2	5.6	3.8	5.8	4.6	7.74	4.98
2019														
1N	20.8	NS ^w	16.8	20.5	18.8	13.7	14.8	12.6	15.1	NS ^w	NS ^{CE}	15.4	16.5	2.77
2N	24.8	NS ^w	22.3	17.6	28.1	28.8	29.2	31.1	30.9	NS ^w	26.5	13.7	25.3	5.52
2L	18.6	11.7	14.9	20	18.1	12.9	14.3	11.8	14.2	14.7	15.4	16	15.2	2.50
5L	3.36	NS ^w	3.57	3.89	<0.2	<0.2	3.21	1.85	4.35	NS ^w	8.47	3.93	4.08	1.80
						2020								
1N	19.2	20.5	NS ^{c-19}	NS ^{c-19}	21.3	20.5	18.3	12.5	20.6	23.6	24.1	24.1	20.5	3.27
2N	25.4	23.4	NS ^{c-19}	NS ^{c-19}	27	34.9	33.6	29.1	35.3	41.1	36.5	36.2	32.3	5.41
2L	16.5	17.6	NS ^{c-19}	NS ^{c-19}	21	19.9	17.3	16.2	18	21.9	21.9	23.5	19.4	2.46
5L	<0.2	2.05	NS ^{c-19}	NS ^{c-19}	3.98	1.82	1.33	<0.2	2.27	2.4	1.76	<0.2	2.23	0.79

NS^{CE}:Not Sampled- unable to access the sampling site due to Carp Extraction;
NS^w = Not Sampled due to Inclement Weather;
NS^{c-19} : Not Sampled due to Covid-19 Cancellation. NA : Sample not available.

Table S2b. Dissolved calcium concentrations (mg/L) in water samples collected from Panther Creek (1N, 2N and PS) and Ledbetter (2L and 5L) sites during the years 2021 and 2022.

2021													Yr.	Stdev
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg.	n=12
1N	26.8	26.1	NS ^W	22.0	19.2	NS ^{BC}	NS ^{BC}	16.5	24.0	NS ^W	25.1	26.6	23.3	3.77
2N	35.2	17.9	12.8	31.8	21.2	NS ^{BC}	37.0	26.4	41.0	40.3	39.5	37.7	31.3	8.64
2L	NS ^{CE}	NS ^W	15.8	20.4	19.7	18.8	18.7	15.5	22.4	24.7	23.6	26.2	21.3	3.67
5L	0.85	<0.2	<0.2	1.92	1.35	<0.2	1.54	0.24	1.42	4.62	3.95	5.63	2.19	1.91
PS	44.4	38.9	40.0	41.0	NS ^W	NS ^{BC}	42.0	39.2	46.9	45.4	45.2	45.0	42.8	3.19
2022														
1N	25.00	NS ^W	25.00	15.00	25.00	NS	NS	22.88	21.06	26.8	NS	22.4	22.0	3.71
2N	27.20	11.00	9.70	4.90	35.50	NS	NS	40.45	39.60	45.5	NS	37.0	27.9	14.4
2L	23.80	20.10	22.90	18.90	22.60	NS	NS	23.08	19.72	23.9	NS	22.0	21.9	1.87
5L	2.70	3.20	2.50	<0.2	3.00	NS	NS	1.32	<0.2	2.46	NS	4.45	2.80	1.12
PS	40.60	36.60	41.80	38.20	44.60	NS	NS	NA2	42.93	47.5	NS	NS	41.8	3.28

NS^{CE}:Not Sampled- unable to access the sampling site due to Carp Extraction;

NS^W = Not Sampled due to Inclement Weather; NS- Not sampled.

NS^{BC}: Not sampled due to boat complications. PS: Panther Spring- Added sampling site during the years 2021-2022.

Table S3a. Dissolved calcium concentrations in Kentucky Lake water during the year 2018.

Cruise #	C-578	C-579	C-580	C-582	C-584	C-586	C-588	C-590	C-592	C-594	C-596	C-597		
Sample ID	1/18/18	2/04/18	3/20/18	4/06/18	5/22/18	6/24/18	7/16/18	8/25/18	9/16/18	10/27/18	11/01/18	12/03/18	Yearly mean	Std. Dev
Kentucky Lake														
CH-1	28.0	38.4	NS	29.4	30.0	21.1	30.9	28.5	15.6	18.8	22.1	22.4	25.9	6.54
CH-B	31.2	39.5	NS	39.7	31.3	25.4	37.5	29.2	14.2	18.8	22.3	22.2	28.3	8.54
CW-1	29.9	18.1	NS	40.2	28.0	17.4	5.9	24.9	15.1	18.7	22.5	22.4	22.1	8.90
CW-B	28.8	NS	NS	NS	29.3	20.4	10.1	29.7	15.1	18.3	22.6	22.4	21.9	6.74
CB-1	NS	19.2	NS	42.4	22.7	23.2	44.1	29.5	16.2	19.7	23.1	22.6	26.3	9.60
CB-B	NS	20.2	NS	43.8	25.8	26.6	NS	33.7	16.4	19.4	22.9	22.6	25.7	8.41
ET-1	30.5	26.0	NS	NS	26.0	17.3	39.0	19.4	15.3	18.7	23.1	22.9	23.8	7.09
ET-B	NS	NS	NS	36.5	NS	NS	41.9	17.0	15.2	18.7	23.0	22.8	25.0	10.2
UT-1	30.5	24.8	NS	36.5	22.9	18.6	42.2	19.0	14.6	18.4	22.9	22.1	24.8	8.41
UA-1	28.5	18.9	NS	40.9	20.5	28.0	17.9	27.6	12.4	17.3	21.1	20.5	23.0	7.74
WL-1	28.7	19.0	18.9	42.5	26.3	14.5	15.7	9.4	15.1	18.6	20.9	21.4	20.9	8.56
WL-B	<0.2	<0.2	<0.2	<0.2	33.9	15.2	20.4	16.0	24.9	18.3	20.7	21.6	21.4	5.94
WA-1	30.2	NS	NS	38.6	26.2	26.6	46.1	25.6	14.0	18.0	21.6	22.0	26.9	9.53
WA-B	NS	NS	NS	NS	NS	NS	46.0	NS	13.9	17.8	21.5	21.9	24.2	12.6
WB-1	28.5	14.5	NS	34.2	17.5	24.5	41.9	16.6	13.0	17.6	18.2	18.6	22.3	9.06
WB-B	NS	NS	NS	21.4	NS	27.9	NS	22.3	13.4	17.2	20.3	21.7	20.6	4.49
WJ-1	NS	19.7	NS	NS	23.2	34.6	21.3	25.7	14.8	18.5	22.0	22.2	22.4	5.50
WJ-B	NS	NS	NS	NS	26.7	NS	13.7	27.0	14.7	18.1	21.5	22.2	20.6	5.32
Total Monthly average	29.5	23.5	18.9	37.2	26.0	22.7	29.7	23.6	15.2	18.4	21.8	21.9	-	-

NS = Not Sampled

Table S3b. Dissolved calcium concentrations in Kentucky Lake water during the year 2019.

Cruise #	C-598	C-599	C-600	C-602	C-604	C-606	C-608	C-610	C-612	C-613	C-614	C-616	Site mean	Std. Dev
Sample ID	1/18/19	2/00/19	3/00/19	4/00/19	5/00/19	6/00/19	7/00/19	8/00/19	9/00/19	10/00/19	11/00/19	12/00/19		
Kentucky Lake														
CH-1	20.5	21.0	18.3	22.1	18.2	13.5	14.5	14.0	15.4	15.1	17.6	17.9	17.3	2.86
CH-B	20.4	20.0	18.2	21.8	18.5	13.4	14.5	13.6	15.0	14.9	17.7	18.1	17.2	2.83
CW-1	21.5	WE	19.2	22.5	18.6	13.4	14.7	13.6	14.9	14.9	17.8	18.3	17.2	3.13
CW-B	21.3	WE	18.8	WE	17.7	13.1	14.6	13.2	14.7	15.0	17.8	18.3	16.4	2.71
CB-1	21.5	WE	19.2	22.1	20.3	14.1	15.1	14.4	15.8	15.6	18.3	18.4	17.7	2.86
CB-B	21.4	WE	19.4	21.9	18.2	14.2	15.3	14.1	15.3	15.4	18.3	18.3	17.4	2.74
ET-1	23.1	WE	18.9	22.1	18.5	13.4	14.4	13.3	14.7	15.3	18.1	18.5	17.3	3.35
ET-B	23.0	WE	18.8	22.3	18.5	12.8	14.3	13.9	14.8	15.4	17.9	18.0	17.2	3.34
UT-1	21.2	WE	17.6	21.0	18.4	12.5	13.8	13.1	14.7	14.5	17.8	17.7	16.6	3.04
UT-B	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	17.4	17.3	-
UA-1	16.7	11.0	13.4	19.0	17.9	11.9	14.0	12.1	13.6	14.8	17.0	15.8	14.8	2.54
UA-B	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	15.8	15.8	-
WA-1	16.9	13.7	12.6	18.9	17.9	12.5	14.1	12.9	14.3	15.2	17.1	17.5	15.3	2.26
WA-B	21.5	12.7	12.2	19.4	17.8	12.8	14.1	12.4	14.3	14.9	17.0	17.4	15.5	3.04
WL-1	17.8	12.7	29.0	20.2	18.3	12.8	14.5	13.2	NS	NS	NS	13.4	16.9	5.32
WL-B	17.8	12.2	14.2	20.2	18.4	12.7	14.5	13.0	NS	NS	NS	NS	15.4	3.02
WJ-1	19.4	16.1	14.6	19.5	17.0	12.8	14.5	12.9	NS	NS	NS	NS	15.8	2.63
WJ-B	17.9	16.1	13.9	NS	18.2	13.1	14.5	11.7	NS	NS	NS	NS	15.2	2.48
Total Monthly average	19.5	15.1	16.6	20.5	18.0	13.0	14.4	13.1	14.8	15.1	17.7	17.4	-	-

WE: Inclement weather cancellation.

NS = Not Sampled

Table S3c. Dissolved calcium concentrations in Kentucky Lake water during the year 2020.

Cruise #	C-617	C-618	C-NS	C-NS	C-620	C-622	C-624	C-626	C-627	C-629	C-631	C-632		
Sample ID	1/31/20	2/28/20	3/00/20	4/00/20	5/27/20	6/30/20	7/30/20	8/31/20	9/16/20	10/20/20	11/18/20	12/8/20	Site mean	Std. Dev
Kentucky Lake														
CH-1	20.0	21.2	Covid	Covid	22.1	19.8	17.7	11.5	20.7	23.1	23.9	23.4	20.3	3.43
CH-B	19.6	20.3	Covid	Covid	21.9	20.2	18.3	11.3	20.5	23.6	23.8	23.4	20.4	3.33
CW-1	20.3	21.2	Covid	Covid	21.6	NS	17.3	20.6	20.6	22.9	23.9	23.1	20.5	2.52
CW-B	20.1	21.4	Covid	Covid	21.3	NS	18.0	20.5	21.3	22.8	24.3	23.1	20.7	2.48
CB-1	19.9	21.1	Covid	Covid	22.4	19.9	18.5	20.5	20.5	22.9	WE	23.6	20.8	2.40
CB-B	20.3	21.1	Covid	Covid	22.0	20.2	18.6	20.1	20.1	23.1	WE	23.6	20.6	2.24
ET-1	20.6	21.5	Covid	Covid	21.3	19.5	17.5	20.8	20.8	23.0	24.0	22.7	20.9	2.65
ET-B	20.5	21.7	Covid	Covid	20.8	19.5	17.3	20.6	20.6	22.4	23.9	22.8	20.7	2.50
UT-1	20.3	21.8	Covid	Covid	21.4	18.7	17.0	20.6	20.6	22.7	24.5	23.0	20.7	2.58
UT-B	19.9	21.2	Covid	Covid	21.0	19.1	17.1	19.9	19.9	22.0	23.7	22.8	20.5	2.39
UA-1	16.4	17.4	Covid	Covid	20.2	19.4	16.3	18.1	18.1	22.0	23.2	22.5	19.2	2.54
UA-B	16.2	17.5	Covid	Covid	20.2	19.4	16.8	17.7	17.7	21.8	23.3	22.5	19.0	2.45
WA-1	17.4	18.2	Covid	Covid	21.8	19.5	16.6	16.4	18.7	22.1	24.3	23.1	19.7	2.84
WA-B	17.3	18.4	Covid	Covid	21.6	19.6	16.4	16.4	19.2	21.7	23.8	22.9	19.6	2.83
Total Monthly average	19.2	20.3	-	-	21.4	19.6	17.4	18.2	20.0	22.6	23.9	23.0	-	-

NS = Not Sampled WE = Inclement weather cancellation. Covid = COVID-19 cancellation

Table S3d. Dissolved calcium concentrations in Kentucky Lake water during the year 2021.

Cruise #	C-633	C-634	C-635	C-637	C-638	C-640	C-642	C-644	C-646	C-648	C-650	C-651	Site mean	Std. Dev
Sample ID	1/22/21	2/23/21	3/31/21	4/28/21	5/14/21	6/03/21	7/17/21	8/24/21	9/30/21	10/21/21	11/22/21	12/08/21		
Kentucky Lake														
CH-1	WE	27.4	21.2	20.4	20.4	20.9	20.2	16.9	25.7	25.1	25.0	27.0	22.7	3.25
CH-B	WE	26.6	20.6	20.9	19.8	21.3	19.9	16.9	25.8	25.1	24.9	26.8	22.6	3.18
CW-1	26.8	26.2	20.6	20.6	19.7	21.3	19.7	18.1	26.1	25.0	24.9	27.4	23.0	3.18
CW-B	27.2	27.0	20.7	20.7	19.5	21.3	19.4	18.1	25.9	25.1	24.7	27.4	23.1	3.31
CB-1	27.3	26.4	20.8	22.0	20.7	22.3	21.1	19.6	25.2	25.0	24.9	27.4	23.6	2.65
CB-B	27.3	26.4	20.8	21.7	20.7	22.1	21.0	20.1	25.2	24.9	25.0	27.4	23.6	2.63
ET-1	26.3	25.8	18.9	21.0	20.0	20.9	20.2	19.4	26.1	25.0	24.8	27.2	23.0	3.00
ET-B	26.5	25.8	19.2	21.1	19.9	20.8	19.5	20.2	25.7	24.9	24.7	27.2	23.0	2.95
UT-1	25.8	25.2	18.3	20.6	19.7	20.5	19.3	19.2	25.8	24.8	24.6	26.8	22.6	3.05
UT-B	25.5	25.9	18.1	20.7	19.7	20.5	19.3	19.0	25.8	24.4	24.4	26.7	22.5	3.07
UA-1	25.0	CARP	14.5	19.8	20.1	20.1	18.6	17.0	22.9	24.3	23.9	25.8	21.1	3.43
UA-B	24.6	CARP	14.2	20.3	19.8	20.2	18.5	17.5	23.1	24.2	23.7	25.8	21.1	3.37
WA-1	24.9	24.6	16.1	20.5	19.7	20.3	19.1	16.7	23.9	24.3	24.3	26.6	21.8	3.31
WA-B	24.6	24.8	16.2	20.5	19.8	19.2	19.0	17.6	23.7	24.3	24.2	27.0	21.7	3.27
Total Monthly average	26.0	26.0	18.6	20.8	20.0	20.8	19.6	18.3	25.0	24.7	24.6	26.9	-	-

NS = Not Sampled WE= Inclement weather cancellation CARP = Unable to access sampling site due to Asian Carp Extraction.

Table S3e. Dissolved calcium concentrations in Kentucky Lake water during the year 2022.

Cruise #	C-652	C-653	C-654	C-655	C-656	C-658	C-660	C-662	C-663	C-665	C-667	C670		
Sample ID	1/27/22	2/26/22	4/01/22	4/15/22	5/17/22	6/--/22	7/--/22	8/04/22	8/23/22	9/22/22	10/26/22	12/27/22	Site mean	Std. Dev
Kentucky Lake														
CH-1	25.8	21.0	27.7	24.7	23.0	NS	NS	22.1	23.7	21.7	25.8	24.4	24.0	2.00
CH-B	25.9	WE	27.5	25.0	23.7	NS	NS	22.1	22.5	20.7	26.9	NS	24.3	2.28
CW-1	25.8	21.0	27.4	24.2	23.3	NS	NS	21.5	22.7	20.5	25.7	23.8	23.6	2.14
CW-B	26.1	WE	27.2	24.1	23.2	NS	NS	21.6	22.8	21.4	25.0	NS	23.9	1.94
CB-1	25.8	20.6	27.7	25.3	24.0	NS	NS	21.9	22.1	20.9	27.3	23.6	23.9	2.42
CB-B	26.0	WE	27.6	25.9	23.3	NS	NS	21.6	23.0	22.0	28.1	NS	24.7	2.37
ET-1	26.3	23.1	27.7	23.8	24.0	NS	NS	NS	22.0	20.4	26.5	22.0	24.0	2.29
ET-B	26.4	23.3	27.6	24.5	23.7	NS	NS	NS	22.2	20.6	25.8	NS	24.3	2.15
UT-1	25.7	22.7	24.7	23.1	23.8	NS	NS	21.4	22.1	20.3	25.7	23.8	23.3	1.69
UT-B	25.8	22.9	23.8	21.0	24.1	NS	NS	21.6	21.7	20.4	26.6	NS	23.1	2.03
UA-1	23.0	20.2	22.2	20.8	22.8	NS	NS	21.1	22.3	19.6	25.5	21.9	21.9	1.59
UA-B	22.9	20.0	21.9	19.3	22.6	NS	NS	NS	22.4	19.1	24.8	NS	21.6	1.86
WA-1	22.7	21.2	23.7	21.6	23.0	NS	NS	21.2	21.8	20.5	25.2	22.1	22.3	1.32
WA-B	22.7	21.4	23.1	21.7	23.2	NS	NS	21.1	21.8	19.7	24.8	NS	22.2	1.39
Total Monthly average	25.1	21.6	25.7	23.2	23.4	-	-	21.6	22.3	20.5	25.9	23.1	23.4	1.96

*NS = Not Sampled *WE= Inclement weather cancellation

Table S4. Dissolved calcium concentrations (mg/L) in water samples collected from the Ohio River at Paducah (KY) and Brookport (IL) sites during the years 2018 to 2020.

Site	2018													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Avg.	Stdev
OH-P	16.6	20.7	NS	31.9	32.1	32.9	37.6	29.8	14.5	68.9	22.5	22.9	30.04	14.1
OH-B	31.1	37.4	54.1	38.5	44.2	51.8	59.6	62.2	30.4	83.2	33.8	27.5	46.15	16.4
2019														
OH-P	19.9	NS ^w	NS ^w	22.5	21.2	NS ^w	14.7	12.8	13.7	NS ^w	16.3	17.0	17.3	3.36
OH-B	34.9	NS ^w	NS ^w	41.5	36.4	NS ^w	30.6	26.9	27.1	NS ^w	33.5	28.2	32.4	4.82
2020														
OH-P	NS ^w	NS ^w	NS ^{c-19}	NS ^{c-19}	26.3	17.3	19	10.7	19.3	23.5	26	25.5	21.0	5.08
OH-B	NS ^w	NS ^w	NS ^{c-19}	NS ^{c-19}	33.1	34.4	31.3	29.2	32.1	39.7	39.5	37.1	34.6	3.62
2021														
OH-P	27.2	25.4	NS ^w	NS ^w	23.9	22.8	20.4	21.8	19.5	26.5	26.2	3.02	24.4	3.16
OH-B	39.7	40.9	NS ^w	NS ^w	39.5	37.8	36.6	37.4	40.2	45.3	44.8	45.8	40.8	3.2
2022														
OH-P	25.5	24.6	28.5	24.4	23.5	-	-	-	-	-	-	-	25.3	1.72
OH-B	37.8	35.8	41.3	37.4	36.8	-	-	-	-	-	-	-	37.8	1.87

NS^w : Not sampled due to inclement weather; NS^{c-19} : Not sampled due to COVID-19 restrictions.

