

## Supplementary Information

Table S1: Lake characteristics (Morphology and Trophic state)

Lake name	Maximum depth in m (MaxDep)	Lake area in ha (LArea)	Shoreline development factor (SDF)	Relative depth ratio (RelDepR)	Total phosphorus in µg/l (TP)	Total organic carbon in mg/l (TOC)	Mean chlorophyll a in µg/l (ChLa)	Secchi depth in m (Secchi)	Ammonium in µg/l (NH4)	Nitrate in µg/l (NO3)
Chodhemster Kolk	10.1	3.2	1.1	0.05	20	8.5	4.3	1.4	50	5
Collrunge	8.6	4.3	1.1	0.04	15	5.1	4.6	2.8	40	50
Donner Kiesgrube 3	5.2	1.0	1.2	0.05	27	6.4	8.9	2.5	15	5
Kiesteich Brelingen	8.7	8.5	2.2	0.03	17	4.2	6.5	1.2	50	780
Kolshorner Teich	16.1	4.3	1.5	0.07	17	4.6	4.8	5.5	15	5
Linner See	11.2	17.7	1.8	0.02	18	6.6	7.4	4.0	15	5
Meitzer See	23.5	19.5	1.3	0.05	8	6.3	2.1	4.5	15	100
Neumanns Kuhle	6.2	6.9	1.1	0.02	160	13.0	65.3	0.5	15	5
Plockhorst	8.2	14.3	1.7	0.02	34	6.9	30.7	0.5	120	790
Saalsdorf	9.2	9.0	1.3	0.03	14	7.0	15.3	1.3	240	860
Schleptruper See	10.1	4.0	1.3	0.04	9	5.2	3.7	4.7	15	40
Stedorfer Baggersee	2.8	1.9	1.2	0.02	23	11.8	10.2	0.9	40	5
Steinwedeler Teich	9.1	10.4	2.0	0.03	10	2.5	5.8	3.0	40	120
Wahle	12.1	8.1	1.4	0.04	10	3.4	7.2	3.2	210	1040
Weidekampsee	4.3	2.9	1.6	0.02	10	5.4	3	2.8	15	5
Wiesedermeer	9.2	2.9	1.7	0.05	19	8.2	6.7	2.1	15	5
Bülstedt	1.1	2.4	1.6	0.01	25	6.7	90.6	1.6	30	2940
Goldbeck	5.0	2.3	1.4	0.03	19	2.9	19.2	2.3	70	770
Handorf	23.0	13.6	1.7	0.06	58	4.9	29.2	1.6	15	310
Hänigsen	12.3	6.2	1.4	0.04	16	5.5	9.8	2.7	50	2040
Heeßel	7.4	0.9	1.3	0.07	29	6.2	12.6	1.7	15	380
Hopels	14.5	5.5	1.3	0.05	12	5.6	4.8	4.5	50	140
Lohmoor	7.4	4.1	2.2	0.03	72	12.4	27.6	0.9	15	5
Pfütze	7.3	10.6	1.8	0.02	13	3.8	5.7	1.9	15	5
Schwicheldt	10.0	1.7	1.8	0.07	16	5.5	2.6	2.6	30	90
Xella	7.3	2.1	1.5	0.04	12	6.2	9.8	0.5	550	650
<b>Mean ± SD</b>	<b>9.6 ± 5.2</b>	<b>6.5 ± 5.2</b>	<b>1.5 ± 0.3</b>	<b>0.04 ± 0.02</b>	<b>26.3 ± 30.4</b>	<b>6.3 ± 2.6</b>	<b>15.3 ± 20</b>	<b>2.4 ± 1.4</b>	<b>67.3 ± 111.8</b>	<b>428 ± 690</b>

Table S2: Lake characteristics (Trophic state and Habitat structure)

Lake name	Conductivity in mS/m (Con)	pH value (pH)	Volume-% of simple dead wood (SDW_Vol)	Volume-% of coarse woody structure (CWS_Vol)	Mean riparian tree coverage from 0 to 4 (Rip_Trees)	Mean riparian reed coverage from 0 to 4 (Reed)	Mean riparian herb coverage from 0 to 4 (Herb)	Litoral macrophyte coverage in % (MP_Cov)	Lake age in years by 2017 (Age)
Chodhemster Kolk	2.1	6.7	0.015	< 0.1	0.4	0.2	3	22.4	46
Collrunge	2	7.9	0.003	0.4	0.8	2.4	1.3	67.9	35
Donner Kiesgrube 3	6.3	7.8	0.002	2.1	1.5	0	1.7	38.5	17
Kiesteich Brelingen	3	7.5	0.006	1.4	0.8	0.1	1.7	12.5	18
Kolshorner Teich	5.5	7.6	0.001	1.1	1	1.3	1.8	37.9	37
Linner See	3	8.5	0.035	1.5	1.2	1.3	1.6	35.8	17
Meitzer See	6.2	7.9	0.003	0.8	0.9	2.5	1.8	33.6	11
Neumanns Kuhle	5.9	8.6	0.002	5.6	1.1	0.5	1.7	34.9	47
Plockhorst	3.4	8	0.002	1	1.2	1.5	1.5	27.6	19
Saalsdorf	5.7	9	0.004	1.2	0.8	2.3	1.6	19.5	22
Schleptruper See	5	8.2	0.004	2	1.1	2	1.7	17.4	52
Stedorfer Baggersee	3.5	7.5	0.001	0.3	1.2	0.3	2.1	59.8	34
Steinwedeler Teich	7.4	7.5	0.001	0.8	1	2	2	49.2	39
Wahle	7.3	7.6	< 0.001	0.3	1	0.9	1.4	26.6	27
Weidekampsee	4.6	8	< 0.001	3.2	1	2.2	1.9	82.3	23
Wiesedermeer	1.4	8	0.001	1.9	0.9	0.9	1.1	62.5	27
Bülstedt	2.9	7.6	0.023	1.6	1.2	1.7	0.2	7.6	26
Goldbeck	2.9	7.9	0.005	0.7	1	0.3	0.7	2.5	25
Handorf	6.7	9.2	0.002	0.2	0.6	0	0.1	8.3	13
Hänigsen	4.4	8.6	0.001	0.6	0.4	1.7	0.6	9	6
Heeßel	5.4	8.2	0.007	3.7	0.8	0	0.4	0	54
Hopels	2.2	7.7	0.028	6.2	1.2	0.8	0.9	8.2	19
Lohmoor	1.6	8.2	0.007	0.1	1	0.9	1.9	29	26
Pfütze	3.4	7.7	0.001	3.4	1.2	0.8	1.8	85.2	17
Schwicheldt	9	8.4	0.001	< 0.1	0.5	0.7	1.7	52.9	10
Xella	9.6	7.5	0.001	0.9	1.2	1.7	1.8	8.5	42
<b>Mean ± SD</b>	<b>4.6 ± 2.2</b>	<b>2.4 ± 1.4</b>	<b>0.006 ± 0.009</b>	<b>1.6 ± 1.6</b>	<b>1 ± 0.3</b>	<b>1.1 ± 0.8</b>	<b>1.5 ± 0.6</b>	<b>32.3 ± 23.8</b>	<b>27.3 ± 13.3</b>

Table S3: Lake characteristics (Landuse, Water and Human Influence)

Lake name	Excavation in 100m- buffer in % (Excav)	Agriculture in 100m- buffer in % (Agric)	Forest in 100m-buffer in % (Forest)	Wetland in 100m- buffer in % (Wetland)	Water surface in 100m- buffer in % (Water)	Distance to next lake in m (DistLake)	Distance to next river in m (DistRiver)	Distance to next chanel in m (DistChannel)	Distance to next road in m (DistRoad)	Urban area in 100m- buffer in % (Urban)
Chodhemster Kolk	0	2.4	0	0	9.4	40	1170	1	135	87.5
Collrunge	0	34.7	0	0	1.6	170	29900	410	20	43.5
Donner Kiesgrube 3	13.2	21.4	0	0	50.4	5	350	150	550	0
Kiesteich Brelingen	0	2.7	66.3	0	8.6	240	7540	1210	70	11.2
Kolshorner Teich	3	22.8	72.6	0	1.6	75	1850	350	630	0
Linner See	0	4.9	11.2	0	6.9	20	25	20	75	64.4
Meitzer See	0	4.3	68.4	0	15	40	425	1630	50	8
Neumanns Kuhle	0	3.2	8.4	14.4	0.9	850	4800	1	40	55.1
Plockhorst	0	14.5	17.2	0	19.2	40	1130	275	15	30.6
Saalsdorf	0	35.5	5.9	0	2.7	80	1470	30	520	55.9
Schleptruper See	0	8.3	24.3	0	2	180	500	1	40	32.6
Stedorfer Baggersee	0	6.5	11.9	0	2.2	5	1320	30	1010	56.1
Steinwedeler Teich	11.6	55.9	25.9	0	1.7	185	38	360	20	0
Wahle	15.3	44	9.1	0	14.4	30	710	250	35	0
Weidekampsee	21.3	47.7	1.7	0	15.9	55	2600	30	365	0
Wiesedermeer	11.7	55.8	29.7	0	2.9	610	29790	250	670	0
Bülstedt	0	52	0	4.3	8	40	820	1180	640	0
Goldbeck	14	6.6	5.6	0	13.1	15	555	110	150	51
Handorf	1.1	20.2	0	0	6.1	30	770	465	230	59.5
Hänigsen	32.2	18.3	5.5	0	0.5	1280	560	305	35	43.5
Heeßel	1.3	10.2	15.4	0	14	10	820	65	30	0
Hopels	6.5	79	0	1.6	2.1	330	31920	5	1530	0
Lohmoor	0	51.9	0	45.1	1.7	830	220	15	1150	0
Pfütze	0	54	8	0	30.1	45	480	40	445	0
Schwicheldt	39	42	15.5	0	3.6	60	3050	15	975	0
Xella	0	3.5	6.3	0	8	1	800	45	395	20.1
<b>Mean ± SD</b>	<b>6.5 ± 10.4</b>	<b>27 ± 22</b>	<b>15.7 ± 21</b>	<b>2.5 ± 9</b>	<b>9.3 ± 10.8</b>	<b>202.5 ± 319.1</b>	<b>4754.4 ± 9452.5</b>	<b>278.6 ± 414.7</b>	<b>377.9 ± 409.1</b>	<b>23.8 ± 27</b>

Table S4: Lake characteristics (Human Influence and Recreational Intensity)

Lake name	Distance to next village or city in m (DistVille)	Distance to next city in m (DistCity)	Garbage related to angling in No./m shore (A_Garb)	Garbage not related to angling in No./m shore (NonA_Garb)	Angling-sites and open spaces in % of shoreline (open_sites)	Trails and paths per shoreline in m/m (trails)	Anglers per visit (anglers)	Dog walker and dogs per visit (dogs)	swimming people per visit (swimmers)	other people per visit (other_people)
Chodhemster Kolk	170	170	0.02	0.1	87.7	1	0	3.6	2.2	6.6
Collrunge	20	9000	0	< 0.1	6.3	0.8	0.5	0.5	0.7	0.8
Donner Kiesgrube 3	600	3650	0	0.3	3.6	1	0	0	0	0.3
Kiesteich Brelingen	150	10500	0.03	1	17.2	0.8	1.3	5.2	4.2	11.9
Kolshorner Teich	460	4180	0.19	1	16.4	1	4.2	0	4.4	1.4
Linner See	380	7630	0.10	1.5	14.3	1	5.1	0.6	6	0.6
Meitzer See	1160	8580	0.06	0.8	8.5	1	3.1	6	10	5.5
Neumanns Kuhle	1400	7470	0.01	0.5	5.5	1	0.6	0.4	0.7	0.6
Plockhorst	180	11180	0.04	1.2	16.4	1	1	2.4	2.4	5.7
Saalsdorf	825	13060	0.06	0.6	18	1	1.2	0.6	1.9	1
Schleptruper See	200	1540	0.02	0.3	17.2	1.1	1.7	1.6	2.5	1.9
Stedorfer Baggersee	240	5240	0.04	0.4	27.4	1.1	0.5	0.4	0.7	0.4
Steinwedeler Teich	775	1230	0.13	1.5	17.1	0.8	4.2	1.6	5.3	3
Wahle	320	8000	0	0.4	25.8	1	1.2	3.5	3	4.5
Weidekampsee	225	13130	0.01	1.5	6.1	0.8	0.3	0.5	0.6	1.7
Wiesedermeer	960	9600	0.04	0.2	8.1	0.6	0.8	0.7	1.4	0.4
Bülstedt	240	11700	0	0	4.9	0.2	0.3	0	0.3	0.3
Goldbeck	300	5960	0.02	< 0.1	7.8	0.2	0	0	0.8	0.5
Handorf	150	1070	0	0.1	4.6	0.9	0	3.3	3.1	3.4
Hänigsen	60	4880	0	0.5	4.6	1.4	0.8	0	1	3.8
Heeßel	710	2080	0	0	7	0.2	0	0	0	0
Hopels	1400	15110	0	2.3	0.8	0.6	0	0.7	0.4	0.4
Lohmoor	1810	7180	0	< 0.1	1.1	0.1	0	0	0	0.1
Pfütze	440	5300	0	0.4	6	0.5	0	0.9	1.1	0.7
Schwicheldt	1150	2010	0	0	0	0	0	0	0	0
Xella	1750	3300	0	0.1	3	0	0.2	0	0.2	0
<b>Mean ± SD</b>	<b>618.3 ± 523.1</b>	<b>6644.2 ± 4122.9</b>	<b>0.03 ± 0.05</b>	<b>0.6 ± 0.6</b>	<b>14.6 ± 17.9</b>	<b>0.7 ± 0.4</b>	<b>1 ± 1.4</b>	<b>1.2 ± 1.7</b>	<b>2 ± 2.3</b>	<b>2.1 ± 2.8</b>

Table S5: PCA-axes and their interpretation for environmental variables.  
 Only the first four axes are shown. Other axes had eigenvalues < 1.

Characteristic	Variable	Dim 1	Dim 2	Dim 3	Dim 4
<b>Morphology</b>	<i>Eigenvalue</i>	1.71	1.47	0.75	0.07
	<i>Proportion of explained variance in %</i>	43	37	19	2
	<i>MaxDep</i>	-0.75	0.09	-0.03	-0.66
	<i>LArea</i>	-0.54	-0.51	-0.39	0.56
	<i>SDF</i>	-0.07	-0.59	0.81	-0.04
	<i>RelDepR</i>	-0.39	0.63	0.45	0.51
	<i>Interpretation of axes</i>	lake shallowness	lake steepness	(not used)	(not used)
	<i>Eigenvalue</i>	2.65	1.69	1.32	1.15
	<i>Proportion of explained variance in %</i>	33	21	16	14
	<b>Trophic state</b>	<i>TP</i>	0.53	-0.14	0.27
<i>TOC</i>		0.47	-0.23	0.13	0.33
<i>CHLa</i>		0.50	0.18	-0.29	-0.24
<i>Secchi</i>		-0.43	-0.26	-0.01	-0.40
<i>NH4</i>		-0.05	0.62	0.20	0.37
<i>NO3</i>		0.13	0.49	-0.54	-0.32
<i>Con</i>		-0.11	0.44	0.58	-0.15
<i>pH</i>		0.21	0.00	0.40	-0.64
<i>Interpretation of axes</i>		trophic state	nitrogen	conductivity	acidity
<b>Habitat structure</b>		<i>Eigenvalue</i>	1.76	1.50	0.95
	<i>Proportion of explained variance in %</i>	29	25	16	13
	<i>SDW_Vol</i>	-0.46	0.24	-0.37	0.62
	<i>CWS_Vol</i>	-0.33	0.56	0.18	-0.31
	<i>Rip_Trees</i>	-0.04	0.68	-0.04	-0.08
	<i>Reed</i>	0.32	0.09	-0.88	-0.24
	<i>Herb</i>	0.51	0.22	0.14	0.66
	<i>MP_Cov</i>	0.56	0.34	0.18	-0.14
	<i>Interpretation of axes</i>	vegetated habitat	woody habitat	(not used)	(not used)

Table S6: PCA-axes and their interpretation for environmental variables.

Only the first four axes are shown. Other axes had eigenvalues < 1.

Characteristic	Variable	Dim 1	Dim 2	Dim 3	Dim 4
<b>Land use (in 100 m around lake)</b>	<i>Eigenvalue</i>	1.45	0.87	0.69	
	<i>Proportion of explained variance in %</i>	48	29	23	
	<i>Excav</i>	0.55	-0.69	-0.48	
	<i>Agric</i>	0.64	-0.02	0.77	
	<i>Forest</i>	-0.54	-0.73	0.43	
	<i>Interpretation of axes</i>	agriculture	(not used)	(not used)	(not used)
<b>Water</b>	<i>Eigenvalue</i>	1.82	1.15	0.96	0.65
	<i>Proportion of explained variance in %</i>	36	23	19	13
	<i>Wetland</i>	0.50	-0.52	0.23	0.24
	<i>Water</i>	-0.51	-0.33	-0.05	0.78
	<i>DistLake</i>	0.63	-0.08	0.15	0.24
	<i>DistRiver</i>	0.28	0.71	-0.29	0.51
	<i>DistChanel</i>	-0.17	0.34	0.92	0.11
	<i>Interpretation of axes</i>	wetland	distance to next river	(not used)	(not used)
<b>Human influence</b>	<i>Eigenvalue</i>	1.86	0.95	0.71	0.48
	<i>Proportion of explained variance in %</i>	47	24	18	12
	<i>Urban</i>	-0.50	0.02	-0.86	0.08
	<i>DistRoad</i>	0.59	-0.05	-0.41	-0.69
	<i>DistHuman</i>	0.54	-0.46	-0.27	0.65
	<i>DistCity</i>	0.33	0.89	-0.14	0.30
	<i>Interpretation of axes</i>	rural	(not used)	(not used)	(not used)
<b>Recreational use</b>	<i>Eigenvalue</i>	3.61	1.81	0.93	0.79
	<i>Proportion of explained variance in %</i>	45	23	12	10
	<i>A_Garb</i>	0.36	0.41	-0.35	0.10
	<i>NonA_Garb</i>	0.29	0.28	0.42	-0.46
	<i>open_sites</i>	0.14	-0.39	-0.76	-0.23
	<i>Trails</i>	0.34	-0.06	-0.01	-0.69
	<i>Anglers</i>	0.42	0.38	-0.17	0.19
	<i>Dogs</i>	0.36	-0.47	0.24	0.26
	<i>Swimmers</i>	0.48	0.03	0.06	0.39
	<i>other_people</i>	0.35	-0.48	0.20	0.00
	<i>Interpretation of axes</i>	general recreational use intensity	non- accessibility	(not used)	(not used)

Table S7: Species list and frequency of occurrence (%) for all species. Taxa are in order: macrophytes, amphibians, odonata, waterfowl, songbirds, riparian trees, and riparian herbs. Species within taxa are ordered by frequency of occurrence. Background color indicates the highest threat status on any used list (international red list IUCN, Annex of EU directives, national red list Germany, regional red list Lower Saxony, see Table 2): **Neobiota are highlighted in green**

		EX EW 0	CR 1 2	EN 3 G	VU R	NT V	LC DD * -
Taxon	Species	in all lakes (N=26) [%]		in managed lakes (N=16) [%]		in unmanaged lakes (N=10) [%]	
submerged macrophytes	<i>Phragmites australis</i>	69	69	70			
	<i>Potamogeton crispus</i>	54	69	30			
	<i>Elodea nuttallii</i>	46	63	20			
	<i>Potamogeton berchtoldii</i>	42	56	20			
	<i>Myriophyllum spicatum</i>	42	50	30			
	<i>Elodea callitrichoides</i>	35	50	10			
	<i>Potamogeton pectinatus</i>	31	50	0			
	<i>Elodea canadensis</i>	31	25	40			
	<i>Nymphaea spec.</i>	23	31	10			
	<i>Nitella flexilis</i>	23	25	20			
	<i>Juncus subnodulosus</i>	23	19	30			
	<i>Typha latifolia</i>	23	19	30			
	<i>Ceratophyllum demersum</i>	19	19	20			
	<i>Juncus bulbosus</i>	19	19	20			
	<i>Chara vulgaris</i>	15	19	10			
	<i>Ranunculus aquatilis</i>	12	19	0			
	<i>Persicaria amphibia</i>	12	13	10			
	<i>Potamogeton natans</i>	12	6	20			
	<i>Chara connivens</i>	8	13	0			
	<i>Chara virgata</i>	8	13	0			
	<i>Potamogeton lucens</i>	8	13	0			
	<i>Ranunculus circinatus</i>	8	13	0			
	<i>Ranunculus peltatus</i>	8	13	0			
	<i>Sparganium emersum</i>	8	13	0			
	<i>Zannichellia palustris</i> <i>ssp. palustris</i>	8	13	0			
	<i>Chara denudata</i>	8	6	10			
	<i>Typha angustifolia</i>	8	6	10			
	<i>Utricularia australis</i>	8	6	10			
	<i>Potamogeton trichoides</i>	8	0	20			
	<i>Alisma plantago-aquatica</i>	4	6	0			
	<i>Chara contraria</i>	4	6	0			
	<i>Calliergonella cuspidata</i>	4	6	0			
<i>Chara globularis</i>	4	6	0				
<i>Chara tenuispina</i>	4	6	0				
<i>Eleocharis acicularis</i>	4	6	0				
<i>Equisetum palustre</i>	4	6	0				
<i>Hippuris vulgaris</i>	4	6	0				
<i>Myriophyllum verticillatum</i>	4	6	0				

submerged macrophytes	<i>Najas marina</i> ssp. <i>marina</i>	4	6	0
	<i>Nitella confervacea</i>	4	6	0
	<i>Nitella hyalina</i>	4	6	0
	<i>Nitella opaca</i>	4	6	0
	<i>Potamogeton compressus</i>	4	6	0
	<i>Potamogeton nodosus</i>	4	6	0
	<i>Potamogeton pusillus</i>	4	6	0
	<i>Sagittaria sagittifolia</i>	4	6	0
	<i>Samolus valerandi</i>	4	6	0
	<i>Stratiotes aloides</i>	4	6	0
	<i>Alisma gramineum</i>	4	0	10
	<i>Alopecurus aequalis</i>	4	0	10
	<i>Carex spec.</i>	4	0	10
	<i>Ceratophyllum submersum</i>	4	0	10
	<i>Chara intermedia</i>	4	0	10
	<i>Eleocharis palustris</i>	4	0	10
	<i>Equisetum fluviatile</i>	4	0	10
	<i>Isoëtes lacustris</i>	4	0	10
	<i>Juncus articulatus</i>	4	0	10
	<i>Juncus effusus</i>	4	0	10
	<i>Potamogeton coloratus</i>	4	0	10
	<i>Ranunculus penicilatus</i>	4	0	10
	amphibians	<i>Bufo bufo</i>	92 (85) <sup>1</sup>	100 (81) <sup>1</sup>
<i>Pelophylax spec.</i> <sup>2</sup>		58 (8) <sup>1</sup>	44 (6) <sup>1</sup>	80 (10) <sup>1</sup>
<i>Rana temporaria</i>		23 (23) <sup>1</sup>	13 (13) <sup>1</sup>	40 (40) <sup>1</sup>
odonata	<i>Ischnura elegans</i>	100	100	100
	<i>Orthetrum cancellatum</i>	85	88	80
	<i>Enallagma cyathigerum</i>	81	88	70
	<i>Platycnemis pennipes</i>	65	75	50
	<i>Coenagrion puella</i>	58	50	70
	<i>Crocothemis erythraea</i>	42	38	50
	<i>Anax imperator</i>	38	50	20
	<i>Sympetrum striolatum</i>	38	44	30
	<i>Calopteryx splendens</i>	31	25	40
	<i>Gomphus pulchellus</i>	27	25	30
	<i>Chalcolestes viridis</i>	23	25	20
	<i>Sympetrum spec.</i>	23	25	20
	<i>Anax parthenope</i>	19	19	20
	<i>Erythromma najas</i>	15	19	10
	unidentified <i>Aeshnidae</i>	15	13	20
	<i>Coenagrion pulchellum</i>	15	13	20
	<i>Libellula quadrimaculata</i>	15	13	20
	<i>Sympetrum sanguineum</i>	15	13	20
	<i>Cordulia aenea</i>	15	0	40

<sup>1</sup> In brackets is the frequency of occurrence for reproduction.

<sup>2</sup> *Pelophylax lessonae* and *Pelophylax ridibundus* are both threatened, their hybridogenic klepton species *Pelophylax kl. esculenta* is not.



odonata	<i>Pyrrhosoma nymphula</i>	15	0	40
	<i>Somatochlora metallica</i>	12	19	0
	<i>Sympetrum vulgatum</i>	12	13	10
	<i>Libellula depressa</i>	12	6	20
	<i>Brachitron pratense</i>	12	0	30
	<i>Ceriagrion tenellum</i>	8	13	0
	<i>Calopteryx virgo virgo</i>	8	6	10
	<i>Sympetrum danae</i>	8	0	20
	<i>Aeshna grandis</i>	4	6	0
	<i>Erythromma lindenii</i>	4	6	0
	<i>Lestes sponsa</i>	4	6	0
	<i>Aeshna cyanea</i>	4	0	10
	<i>Calopteryx spec.</i>	4	0	10
	<i>Leucorrhinia caudalis</i>	4	0	10
	<i>Orthetrum coerulescens</i>	4	0	10
	waterfowl	<i>Anas platyrhynchos</i>	92	94
<i>Fulica atra</i>		88	94	80
<i>Aythya fuligula</i>		85	88	80
<i>Anser anser</i>		77	88	60
<i>Podiceps cristatus</i>		65	69	60
<i>Phalacrocorax carbo</i>		65	56	80
<i>Alopochen aegyptiaca</i>		50	44	60
<i>Cygnus olor</i>		46	50	40
<i>Branta canadensis</i>		46	38	60
<i>Actitis hypoleucos</i>		38	44	30
<i>Ardea cinerea</i>		38	25	60
<i>Alcedo atthis</i>		27	19	40
<i>Circus aeruginosus</i>		23	31	10
<i>Gallinula chloropus</i>		23	19	30
<i>Acrocephalus palustris</i>		19	25	10
<i>Anas crecca</i>		15	25	0
<i>Chroicocephalus ridibundus</i>		15	25	0
<i>Anas strepera</i>		12	19	0
<i>Motacilla alba</i>		12	19	0
<i>Pandion haliaetus</i>		12	19	0
<i>Acrocephalus scirpaceus</i>		12	13	10
<i>Haliaeetus albicilla</i>		8	13	0
<i>Tadorna tadorna</i>		8	13	0
<i>Anas clypeata</i>		8	6	10
<i>Haematopus ostralegus</i>		8	6	10
<i>Anas querquedula</i>		8	0	20
<i>Ardea alba</i>		8	0	20
<i>Tachybaptus ruficollis</i>		8	0	20
<i>Acrocephalus arundinaceus</i>		4	6	0
<i>Larus fuscus</i>		4	6	0
<i>Sterna paradisaea</i>		4	6	0
<i>Anas penelope</i>		4	0	10
<i>Ciconia ciconia</i>	4	0	10	

	<i>Mergus merganser</i>	4	0	10
songbirds	<i>Fringilla coelebs</i>	96	94	100
	<i>Phylloscopus collybita</i>	96	94	100
	<i>Turdus merula</i>	92	88	100
	<i>Turdus philomelos</i>	77	63	100
	<i>Erithacus rubecula</i>	65	63	70
	<i>Troglodytes troglodytes</i>	58	56	60
	<i>Corvus corone</i>	54	38	80
	<i>Emberiza citrinella</i>	50	44	60
	<i>Columba palumbus</i>	42	31	60
	<i>Sylvia atricapilla</i>	38	50	20
	<i>Parus caeruleus</i>	38	38	40
	<i>Phylloscopus trochilus</i>	35	25	50
	<i>Sylvia communis</i>	31	38	20
	<i>Aegithalos caudatus</i>	31	31	30
	<i>Alauda arvensis</i>	31	19	50
	<i>Parus major</i>	27	13	50
	<i>Acrocephalus scirpaceus</i>	23	31	10
	<i>Picus viridis</i>	15	6	30
	<i>Remiz pendulinus</i>	12	19	0
	<i>Garrulus glandarius</i>	12	13	10
	<i>Corvus frugilegus</i>	8	13	0
	<i>Carduelis chloris</i>	8	6	10
	<i>Luscinia megarhynchos</i>	8	6	10
	<i>Prunella modularis</i>	8	0	20
	<i>Anthus trivialis</i>	4	6	0
	<i>Carduelis carduelis</i>	4	6	0
	<i>Dendrocopus major</i>	4	6	0
	<i>Locustella naevia</i>	4	6	0
	<i>Oriolus oriolus</i>	4	6	0
	<i>Passer montanus</i>	4	6	0
<i>Sitta europaea</i>	4	6	0	
<i>Corvus corone cornix</i>	4	0	10	
<i>Panurus biarmicus</i>	4	0	10	
<i>Phoenicurus ochruros</i>	4	0	10	
<i>Pica pica</i>	4	0	10	
<i>Streptopelia decaocto</i>	4	0	10	
riparian trees	<i>Betula spec.</i>	96	94	100
	<i>Salix caprea</i>	85	94	70
	<i>Salix alba</i>	85	88	80
	<i>Alnus glutinosa</i>	85	81	90
	<i>Quercus spec.</i>	81	88	70
	<i>Populus tremula</i>	77	69	90
	<i>Crataegus spec.</i>	65	81	40
	<i>Sorbus spec.</i>	62	69	50
	<i>Pinus spec.</i>	58	56	60
	<i>Salix cinerea</i>	54	38	80
	<i>Prunus spec.</i>	46	56	30

riparian trees	<i>Salix spec.</i>	46	44	50
	<i>Fraxinus excelsior</i>	31	44	10
	<i>Acer pseudoplatanus</i>	31	25	40
	<i>Sambucus nigra</i>	27	38	10
	<i>Acer campestre</i>	27	31	20
	<i>Rosa spec.</i>	27	31	20
	<i>Prunus padus</i>	23	31	10
	<i>Corylus avellana</i>	23	25	20
	<i>Populus spec.</i>	23	13	40
	<i>Carpinus betulus</i>	19	19	20
	<i>Prunus domestica</i>	19	19	20
	<i>Prunus serotina</i>	19	6	40
	<i>Tilia spec.</i>	15	13	20
	<i>Cornus spec.</i>	12	13	10
	<i>Salix babylonica</i>	12	13	10
	<i>Viburnum spec.</i>	12	13	10
	<i>Picea abies</i>	12	6	20
	<i>Prunus avium</i>	12	6	20
	<i>Ulmus spec.</i>	12	6	20
	<i>Aesculus hippocastanum</i>	8	13	0
	<i>Fagus sylvatica</i>	8	13	0
	<i>Juglans regia</i>	8	6	10
	<i>Robinia spec.</i>	8	6	10
	<i>Ulmus glabra</i>	8	6	10
	<i>Acer platanoides</i>	8	0	20
	<i>Cornus mas</i>	4	0	10
	<i>Euonymus europaeus</i>	4	6	0
	<i>Ligustrum spec.</i>	4	6	0
	<i>Salix purpurea</i>	4	6	0
	<i>Salix viminalis</i>	4	6	0
	<i>Larix decidua</i>	4	0	10
	<i>Quercus robur</i>	4	0	10
<i>Quercus rubra</i>	4	0	10	
riparian herbs	<i>Poa spec.</i>	100	100	100
	<i>Rubus spec.</i>	96	100	90
	<i>Deschampsia spec.</i>	96	94	100
	<i>Galium aparine</i>	96	94	100
	<i>Bromus spec.</i>	92	88	100
	<i>Urtica dioica</i>	92	88	100
	<i>Equisetum spec.</i>	88	81	100
	<i>Quercus spec. (juveniles)</i>	88	81	100
	<i>Taraxacum officinalis</i>	77	88	60
	<i>Dactylus glomerata</i>	77	75	80
	<i>Phragmites australis</i>	77	75	80
	<i>Juncus spec.</i>	77	69	90
	Thistle	73	75	70
	<i>Prunus spec. (juveniles)</i>	73	75	70
	<i>Glechoma hederacea</i>	73	69	80

riparian herbs

<i>Plantago lanceolata</i>	69	81	50
<i>Vicia spec.</i>	69	81	50
<i>Rumex spec.</i>	69	75	60
<i>Crataegus spec. (juveniles)</i>	69	63	80
<i>Populus tremola (juveniles)</i>	69	63	80
<i>Carex spec.</i>	62	63	60
<i>Geum urbanun</i>	62	56	70
<i>Rosa spec. (juveniles)</i>	62	56	70
<i>Ranunculus spec.</i>	58	63	50
<i>Sorbus spec. (juveniles)</i>	54	44	70
<i>Solidago spec.</i>	50	44	60
<i>Aegopodium podagraria</i>	46	50	40
<i>Prunus domestica (juveniles)</i>	46	50	40
<i>Trifolium spec.</i>	46	44	50
<i>Alnus glutinosa (juveniles)</i>	46	38	60
<i>Epilobium spec.</i>	46	38	60
<i>Acer campestre (juveniles)</i>	42	38	50
<i>Prunus padus (juveniles)</i>	42	31	60
<i>Convolvulus arvensis</i>	38	44	30
<i>Anthriscus spec.</i>	38	38	40
<i>Hypericum spec.</i>	38	38	40
<i>Prunus serotina (juveniles)</i>	38	38	40
<i>Tanacetum vulgare</i>	38	38	40
<i>Lycopus spec.</i>	38	31	50
<i>Cornus spec. (juveniles)</i>	35	38	30
<i>Hypochaeris spec.</i>	35	38	30
<i>Stellaria media</i>	35	31	40
<i>Alliaria petiolata</i>	35	19	60
<i>Fraxinuns excelsior (juveniles)</i>	35	13	70
<i>Lotus spec.</i>	35	13	70
Fern	31	38	20
<i>Salix cinarea (juveniles)</i>	31	31	30
<i>Achillea millefolium</i>	31	25	40
<i>Betula spec. (juveniles)</i>	31	25	40
<i>Acer pseudoplatanus (juveniles)</i>	31	13	60
<i>Salix caprea (juveniles)</i>	27	38	10
<i>Taraxacum spec.</i>	27	38	10
<i>Salix alba (juveniles)</i>	27	31	20
<i>Senecio spec.</i>	27	31	20
<i>Mentha aquatica</i>	27	25	30
<i>Corylus avellana (juveniles)</i>	27	19	40
<i>Lonicera spec.</i>	27	13	50
<i>Milium effusum</i>	27	6	60
<i>Pinus spec. (juveniles)</i>	23	25	20
<i>Tussilago farfara</i>	23	19	30
<i>Cardamine pratensis</i>	23	13	40
<i>Potentilla spec.</i>	19	31	0
<i>Populus spec. (juveniles)</i>	19	25	10

<i>Anthriscus sylvestris</i>	19	19	20
<i>Myosotis spec.</i>	19	19	20
<i>Pteridium aquilinum</i>	19	19	20
<i>Rubus ideaus</i>	19	19	20
<i>Salix spec. (juveniles)</i>	19	19	20
<i>Genista spec.</i>	19	13	30
<i>Geranium spec.</i>	19	13	30
<i>Lupinus spec.</i>	19	13	30
<i>Clematis vitalba</i>	19	6	40
<i>Geranium robertianum</i>	19	6	40
<i>Acer platanoides (juveniles)</i>	19	0	50
<i>Carpinus betulus (juveniles)</i>	15	19	10
<i>Galium spec.</i>	15	19	10
<i>Ranunculus acris</i>	15	19	10
<i>Viburnum spec. (juveniles)</i>	15	19	10
<i>Hedera helix</i>	15	13	20
<i>Iris spec.</i>	15	13	20
<i>Bellis perennis</i>	12	19	0
<i>Heracleum sphondylium</i>	12	19	0
<i>Hieracium pilosella</i>	12	19	0
<i>Lamium album</i>	12	19	0
<i>Plantago major</i>	12	19	0
<i>Ranunculus repens</i>	12	19	0
<i>Scirpus spec.</i>	12	19	0
<i>Artemisia vulgaris</i>	12	13	10
<i>Iris pseudacorus</i>	12	13	10
<i>Phalaris spec.</i>	12	13	10
<i>Trifolium campestre</i>	12	13	10
<i>Arrhenaterum spec.</i>	12	6	20
<i>Bromus erectus</i>	12	6	20
<i>Capsella bursa-pastoris</i>	12	6	20
<i>Chelidonium majus</i>	12	6	20
<i>Euonymus europaeus (juveniles)</i>	12	6	20
<i>Fabaceae</i>	12	6	20
<i>Fagus sylvatica (juveniles)</i>	12	6	20
<i>Fragaria vesca</i>	12	6	20
<i>Hieracium spec.</i>	12	6	20
<i>Humulus spec.</i>	12	6	20
<i>Lysimachia nummularia</i>	12	6	20
<i>Oenothera spec.</i>	12	6	20
<i>Poa annua</i>	12	6	20
<i>Ligustrum spec. (juveniles)</i>	12	0	30
<i>Cerastium holosteoides</i>	8	13	0
<i>Cornus sanguinea (juveniles)</i>	8	13	0
<i>Filipendula ulmaria</i>	8	13	0
<i>Juncus subnodulosus</i>	8	13	0
<i>Leucanthemum spec.</i>	8	13	0
<i>Oenothera biennis</i>	8	13	0

<i>Orchidee</i>	8	13	0
<i>Phalaris arundinacea</i>	8	13	0
<i>Scandix pecten-veneris</i>	8	13	0
<i>Solidago virgaurea</i>	8	13	0
<i>Tilia spec. (juveniles)</i>	8	13	0
<i>Veronica spec.</i>	8	13	0
<i>Sambucus nigra (juveniles)</i>	8	6	10
<i>Silene dioica</i>	8	6	10
<i>Solidago canadensis</i>	8	6	10
<i>Solanaceae</i>	8	6	10
<i>Viola spec.</i>	8	6	10
<i>Deschampsia flexuosa</i>	8	0	20
<i>Prunus avium (juveniles)</i>	8	0	20
<i>Stellaria spec.</i>	8	0	20
<i>Artemisia spec.</i>	8	0	20
<i>Agrimonia eupatoria</i>	4	6	0
<i>Allium ursinum</i>	4	6	0
<i>Alopecurus pratensis</i>	4	6	0
<i>Alopecurus spec.</i>	4	6	0
<i>Arabidopsis thalia</i>	4	6	0
<i>Arctium spec.</i>	4	6	0
<i>Argentina anserina</i>	4	6	0
<i>Bambus</i>	4	6	0
<i>Bromus hordeaceus</i>	4	6	0
<i>Carex aquatilis</i>	4	6	0
<i>Circaea spec.</i>	4	6	0
<i>Crepis spec.</i>	4	6	0
<i>Cyanus spec.</i>	4	6	0
<i>Erica vulagris</i>	4	6	0
<i>Epilobium hirsutum</i>	4	6	0
<i>Heracleum spec.</i>	4	6	0
<i>Leucanthemum vulgare</i>	4	6	0
<i>Lamium purpurea</i>	4	6	0
<i>Lathyrus spec.</i>	4	6	0
<i>Linum spec.</i>	4	6	0
<i>Lotus purpureus</i>	4	6	0
<i>Lycopus europaeus</i>	4	6	0
<i>Picea abies (juveniles)</i>	4	6	0
<i>Picris hieracioides</i>	4	6	0
<i>Polygonaceae</i>	4	6	0
<i>Raphanus raphanistrum</i>	4	6	0
<i>Rumex acetosella</i>	4	6	0
<i>Sanguisorba minor</i>	4	6	0
<i>Sanguisorba officinalis</i>	4	6	0
<i>Senecio inaequidens</i>	4	6	0
<i>Tragopogon spec.</i>	4	6	0
<i>Trifolium aureum</i>	4	6	0
<i>Trifolium dubium</i>	4	6	0

riparian herbs	<i>Veronica chamaedrys</i>	4	6	0
	<i>Cornus mas (juveniles)</i>	4	0	10
	<i>Hieracium aurantiacum</i>	4	0	10
	<i>Juglans regia (juveniles)</i>	4	0	10
	<i>Lamium galeobdolon</i>	4	0	10
	<i>Lamium maculatum</i>	4	0	10
	<i>Mentha spec.</i>	4	0	10
	<i>Osmunda regalis</i>	4	0	10
	<i>Oxalis spec.</i>	4	0	10
	<i>Papaver spec.</i>	4	0	10
	<i>Poa nemoralis</i>	4	0	10
	<i>Quercus robur (juveniles)</i>	4	0	10
	<i>Saponaria spec.</i>	4	0	10
	<i>Silene latifolia</i>	4	0	10
	<i>Sisymbrium officinale</i>	4	0	10
	<i>Ulmus spec. (juveniles)</i>	4	0	10
	<i>Verbascum spec.</i>	4	0	10
<i>Viburnum latana (juveniles)</i>	4	0	10	

Table S8: Variance inflation factors (VIFs) for explanatory variables (axes from from Table S5 & Table S6). VIFs > 5 indicate highly correlated variables in the multivariate space.

<b>Variable</b>	<b>VIF</b>
lake shallowness	4.70
lake steepness	2.35
vegetated habitat	2.13
woody habitat	3.46
trophic state	3.16
nitrogen	1.82
conductivity	2.94
acidity	2.48
agriculture	2.70
wetland	2.84
distance to next river	1.50
rural	2.77
general recreational use intensity	4.23
non-accessibility	2.58
Age	2.72

Table S9: PCA-axes and their interpretation for species richness including the loadings of explanatory variables from RDA. Names of these variables are interpretations from Table S5 & Table S6. Only the first four axes are shown. Other axes had eigenvalues < 1.

<i>Species richness</i>	<b>Dim 1</b>	<b>Dim 2</b>	<b>Dim 3</b>	<b>Dim 4</b>
<i>Eigenvalue</i>	2.24	1.37	1.31	0.97
<i>Proportion of variance explained in %</i>	32.02	19.57	18.73	13.92
submerged macrophytes	-0.32	0.75	0.47	-0.08
riparian_herbs	0.62	-0.35	0.53	-0.29
riparian_trees	-0.59	0.13	0.71	0.03
amphibians	0.75	0.23	0.19	-0.31
odonata	0.50	0.61	-0.30	-0.34
song_birds	0.64	-0.21	0.42	0.40
waterfowl	0.44	0.45	-0.05	0.72
<i>Interpretation of Axes</i>	<i>Riparian Species Richness</i>	<i>Macrophytes and Odonata</i>	<i>Riparian Trees</i>	<i>Waterfowl</i>
woody_habitat	-0.67	0.22	0.18	-0.02
vegetated_habitat	-0.13	0.49	-0.21	-0.18
rural	0.10	0.23	0.03	-0.11
lake_steepness	-0.08	-0.34	-0.26	-0.48



Table S10: PCA-axes and their interpretation for conservation value including the loadings of explanatory variables from RDA. Names of these variables are interpretations from Table S5 & Table S6. Only the first four axes are shown. Other axes had eigenvalues < 1.

<b>Conservation value</b>	<b>Dim 1</b>	<b>Dim 2</b>	<b>Dim 3</b>	<b>Dim 4</b>
<i>Eigenvalue</i>	2.17	1.51	1.21	0.90
<i>Proportion of variance explained in %</i>	30.99	21.59	17.35	12.87
macrophytes	0.74	0.00	0.17	-0.40
riparian_herbs	0.44	-0.33	0.79	-0.02
riparian_trees	0.41	-0.50	-0.71	-0.12
amphibians	-0.76	0.30	0.03	-0.06
odonata	0.48	0.10	-0.02	0.84
song_birds	0.23	0.87	0.03	-0.08
waterfowl	0.63	0.54	-0.24	-0.11
<i>Interpretation of Axes</i>	<i>Aquatic conservation value (macrophytes, odonata, waterfowl)</i>	<i>Songbirds conservation value</i>	<i>Riparian herbs conservation value</i>	<i>(not used)</i>
woody_habitat	0.15	-0.46	0.32	-0.21
general_recreational use_intensity	0.43	0.22	0.15	-0.17