



Supplementary document 1. Plot of the first and second principal component (PC). Ponds that had been classified as forest ponds are shown in teal (PC1 < 0), agricultural ponds in brown (PC1 > 0).

Supplementary document 2. Contribution of variables to principal components (PC), Eigenvalues and proportion of explained variance for each PC.

Variable	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Forest	-0.426	-0.158	-0.003	0.062	0.116	-0.196	-0.048	0.407	0.755
Altitude	-0.337	0.182	-0.529	0.123	-0.177	0.149	0.701	-0.120	0.011
Meadow	-0.169	-0.665	0.325	0.169	-0.448	0.368	0.076	-0.225	0.043
Submersed vegetation	0.192	-0.541	-0.326	-0.601	0.398	0.129	0.166	0.011	0.020
Settlement	0.330	-0.126	-0.420	0.563	0.244	0.112	-0.259	-0.392	0.299
pH	0.339	-0.089	0.455	0.327	0.376	-0.170	0.619	0.096	0.033
Conductivity	0.348	-0.250	-0.244	-0.004	-0.524	-0.687	0.074	0.068	0.013
Total agriculture	0.357	0.345	0.201	-0.387	-0.256	0.174	0.134	-0.336	0.581
Streets	0.409	0.049	-0.157	0.135	-0.235	0.493	-0.003	0.699	0.017
Eigenvalue	2.277	1.167	0.988	0.783	0.707	0.438	0.363	0.199	0.013
% exp. Var.	0.576	0.151	0.108	0.068	0.055	0.021	0.015	0.004	0.000

Supplementary document 3. Eigenvectors for each pond and principal component.

Pond-ID	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
P01	-2.332	-0.762	-1.101	-0.738	-0.269	0.772	-0.124	-0.159	-0.002
P02	-1.910	-0.647	1.502	1.032	-0.684	-0.173	-0.223	-0.293	-0.007
P03	-1.974	0.680	-0.277	-0.394	0.648	-0.616	-0.745	0.140	0.000
P04	-0.950	-1.367	0.697	-0.451	1.208	-0.085	0.483	0.086	-0.017
P05	-2.910	1.633	-1.308	0.417	-0.288	-0.297	0.554	-0.032	0.001
P06	-1.305	-1.106	0.604	0.262	-0.311	0.222	0.066	0.322	0.027
P07	2.764	-0.985	-0.732	-0.667	-1.255	-0.348	-0.056	0.132	-0.013
P08	1.464	1.907	1.109	0.238	-0.340	0.338	0.111	0.217	-0.011
P09	3.177	-0.814	-0.882	1.053	0.487	-0.332	0.129	-0.115	0.010
P10	2.110	0.563	-0.523	0.631	0.672	0.640	-0.326	-0.023	-0.004
P11	1.865	0.897	0.913	-1.384	0.133	-0.121	0.130	-0.275	0.017

Supplementary document 4. Length of the caudal filament (CF) and max. height of the tail (T) of male *Lissotriton helveticus* captured in March/April and May 2018 and the results of parametric and nonparametric tests. P-values < 0.05 are presented in bold. ¹ As only two males were captured in May, no statistical test was performed.

Variable	Pond	March/April		May		Statistical test to compare March and May			
		mean (mm)	SD	mean (mm)	SD	Test	Test statistic (t or W)	df	p
CF	P03	4.7	1.5	5.3	2.1	t-test	-0.813	12.516	0.432
	P05	2.8	0.9	5.8	1.2	t-test	-10.862	40.804	< 0.001
	P07 ¹	5.2	1.0	1.5	0.4	–	–	–	–
T	P03	9.7	0.9	8.8	1.1	U-test	364.500	–	0.016
	P05	8.4	1.0	10.3	0.6	U-test	58.500	–	< 0.001
	P07 ¹	8.2	0.7	4.3	0.0	–	–	–	–

Supplementary document 5. List of all full and candidate models that were used to calculate model-averaged coefficients describing the response variables (SVL = snout-vent length; SMI = scaled mass index; T = max. height of Tail; CF = caudal filament) with the model type (GLMM = generalized linear mixed model with an Gaussian error distribution and a log-link function; LMM = linear mixed model), degrees of freedom (df), the Akaike Information Criterion with a correction for small sample sizes (AICc), the difference to the best model (Δ AICc) and the weight of a candidate model (AICc weight). Only models with a Δ AICc < 4 were considered. : = interaction between fixed effects; (1|Pond-ID) = random effect.

Model type	Response	Model	df	AICc	Δ AICc	AICc weight
GLMM	SVL	~ Sex + Pond type + Submersed vegetation + Meadow + (1 Pond-ID)				Full model
		~ Sex + Pond type + Submersed vegetation + Meadow + (1 Pond-ID)	7	4076.4	0.00	0.603
		~ Sex + Pond type + Meadow + (1 Pond-ID)	6	4078.6	2.19	0.201
		~ Sex + Pond type + Submersed vegetation + (1 Pond-ID)	6	4079.2	2.75	0.152
LMM	SVL	~ Sex + Age + Pond type + Submersed vegetation + Meadow + (1 Pond-ID)				Full model
		~ Sex + Age + Pond type + (1 Pond-ID)	6	650.7	0.00	0.373
		~ Sex + Age + Pond type + Meadow + (1 Pond-ID)	7	650.7	0.05	0.364
		~ Sex + Age + Pond type + Submersed vegetation + (1 Pond-ID)	7	654.4	3.70	0.059
GLMM	Body mass	~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)				Full model
		~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + (1 Pond-ID)	8	-241.6	0.00	0.307
		~ Sex + SVL + Submersed vegetation + (1 Pond-ID)	6	-240.1	1.43	0.150
		~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)	9	-240.0	1.61	0.137
		~ Sex + Pond type + SVL + Submersed vegetation + (1 Pond-ID)	7	-239.6	1.95	0.116
		~ Sex + Pond type + SVL + Pond type : SVL + (1 Pond-ID)	7	-238.7	2.89	0.072
		~ Sex + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	7	-238.2	3.36	0.057
		~ Sex + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	8	-237.9	3.67	0.049
GLMM	Body mass	~ Sex + Age + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)				Full model
		~ Sex + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	7	-7.2	0.00	0.186
		~ Sex + Age + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	8	-6.8	0.42	0.151
		~ Sex + SVL + Submersed vegetation + (1 Pond-ID)	6	-6.3	0.96	0.116
		~ Sex + Age + SVL + Submersed vegetation + (1 Pond-ID)	7	-5.6	1.65	0.081
		~ Sex + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	8	-5.0	2.18	0.063
		~ Sex + Age + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	9	-4.6	2.67	0.049
		~ Sex + Pond type + SVL + Submersed vegetation + (1 Pond-ID)	7	-4.1	3.17	0.038
		~ Sex + SVL + Meadow + (1 Pond-ID)	6	-3.7	3.56	0.031
		~ Sex + Pond type + SVL + Meadow + (1 Pond-ID)	7	-3.3	3.91	0.026
		~ Sex + Age + Pond type + SVL + Submersed vegetation + (1 Pond-ID)	8	-3.3	3.91	0.026
		~ Sex + Pond type + SVL + (1 Pond-ID)	6	-3.3	3.95	0.026
		GLMM	SMI	~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)		
~ Sex + SVL + Submersed vegetation + (1 Pond-ID)	6			-296.8	0.00	0.239
~ Sex + Pond type + SVL + Submersed vegetation + (1 Pond-ID)	7			-296.6	0.22	0.215
~ Sex + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	8			-295.7	1.15	0.134
~ Sex + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	7			-294.8	2.03	0.087
~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + (1 Pond-ID)	8			-294.6	2.22	0.079
~ Sex + SVL + (1 Pond-ID)	5			-294.0	2.82	0.058
~ Sex + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)	9			-293.7	3.18	0.049
~ Sex + Pond type + SVL + (1 Pond-ID)	6			-293.6	3.22	0.048
~ Sex + Pond type + SVL + Meadow + (1 Pond-ID)	7			-293.1	3.70	0.038

Supplementary document 5 continued

Model type	Response	Model	df	AICc	ΔAICc	AICc weight
GLMM	SMI	~ Sex + Age + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)				
					Full model	
		~ Sex + Age + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	8	-20	0.00	0.330
		~ Sex + Age + Pond type + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	9	-18.2	1.75	0.137
		~ Sex + Age + SVL + Submersed vegetation + (1 Pond-ID)	7	-17.3	2.65	0.087
		~ Sex + Age + Pond type + SVL + Pond type : SVL + Submersed vegetation + Meadow + (1 Pond-ID)	10	-16.7	3.24	0.065
		~ Sex + Age + SVL + Meadow + (1 Pond-ID)	7	-16.5	3.49	0.058
		~ Sex + SVL + Submersed vegetation + Meadow + (1 Pond-ID)	7	-16.0	3.95	0.046
LMM	T	~ Pond type + SVL + Pond type : SVL + SMI + Submersed vegetation + Meadow + (1 Pond-ID)				
					Full model	
		~ SVL + SMI + (1 Pond-ID)	5	1196.7	0.00	0.617
		~ Pond type + SVL + SMI + (1 Pond-ID)	6	1198.2	1.50	0.291
LMM	T	~ Age + Pond type + SVL + Pond type : SVL + SMI + Submersed vegetation + Meadow + (1 Pond-ID)				
					Full model	
		~ Pond type + SVL + SMI + (1 Pond-ID)	6	210.6	0.00	0.267
		~ SVL + SMI + (1 Pond-ID)	5	210.8	0.21	0.240
		~ Pond type + SVL + SMI + Meadow + (1 Pond-ID)	7	211.4	0.81	0.178
		~ SVL + SMI + Meadow + (1 Pond-ID)	6	211.9	1.32	0.138
LMM	CF	~ Pond type + SVL + Pond type : SVL + SMI + Submersed vegetation + Meadow + (1 Pond-ID)				
					Full model	
		~ Pond type + SVL + SMI + (1 Pond-ID)	6	1440.3	0.00	0.386
		~ SVL + SMI + (1 Pond-ID)	5	1441.1	0.75	0.265
		~ SVL + SMI + Submersed vegetation + (1 Pond-ID)	6	1442.8	2.50	0.111
		~ Pond type + SVL + SMI + Submersed vegetation + (1 Pond-ID)	7	1443.5	3.14	0.080
		~ Pond type + SVL + Pond type : SVL + SMI + (1 Pond-ID)	7	1444.3	3.99	0.053
LMM	CF	~ Pond type + SVL + Pond type : SVL + SMI + Submersed vegetation + Meadow + (1 Pond-ID)				
					Full model	
		~ Pond type + SVL + SMI + Meadow + (1 Pond-ID)	7	240.6	0.00	0.143
		~ Pond type + SVL + SMI + (1 Pond-ID)	6	240.6	0.01	0.143
		~ Pond type + Meadow + (1 Pond-ID)	5	242.3	1.68	0.062
		~ SVL + SMI + (1 Pond-ID)	5	242.6	1.98	0.053
		~ Pond type + (1 Pond-ID)	4	242.6	2.00	0.053
		~ (1 Pond-ID)	3	242.8	2.21	0.047
		~ SVL + SMI + Meadow + (1 Pond-ID)	6	242.9	2.23	0.047
		~ Pond type + SVL + Meadow + (1 Pond-ID)	6	243.1	2.50	0.041
		~ Pond type + SMI + Meadow + (1 Pond-ID)	6	243.4	2.82	0.035
		~ Pond type + SVL + (1 Pond-ID)	5	243.5	2.83	0.035
		~ Meadow + (1 Pond-ID)	4	243.6	2.99	0.032
		~ Pond type + SMI + (1 Pond-ID)	5	243.7	3.06	0.031
~ SMI + (1 Pond-ID)	4	243.8	3.21	0.029		
		~ SVL + SMI + Submersed vegetation + Meadow + (1 Pond-ID)	7	244.5	3.90	0.020

Supplementary document 6. Results from testing for linkage disequilibrium for each locus pair across all populations with GENEPOP 4.6 (Fisher's method). No linkage disequilibrium was found (all p-values > 0.05).

Locus pair	chi ²	Df	p
Lh7 & Lh44	11.759	20	0.924
Lh7 & Us9	14.909	22	0.866
Lh44 & Us9	13.841	20	0.838
Lh7 & Lh16	18.250	22	0.691
Lh44 & Lh16	19.766	20	0.473
Us9 & Lh16	15.899	22	0.821
Lh7 & Lh19	4.498	8	0.810
Lh44 & Lh19	6.830	6	0.337
Us9 & Lh19	6.210	8	0.624
Lh16 & Lh19	4.303	8	0.829

Supplementary document 7. Results from testing each population and Loci for Hardy-Weinberg equilibrium (HWE). NA = test was not possible because there is only one allele in the population. P-values < 0.05 are presented in bold.

Loci	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11
Lh7	0.918	0.455	0.723	0.729	0.922	0.202	0.289	0.065	0.488	0.910	0.957
Lh44	0.993	0.892	0.633	0.880	0.741	0.789	NA	0.477	0.952	0.807	0.507
Us9	0.314	0.295	0.324	0.636	0.429	0.512	0.709	0.098	0.180	0.441	0.311
Lh16	0.404	0.974	0.919	0.001	0.440	0.775	0.899	0.809	0.411	0.411	0.238
Lh19	NA	0.699	0.740	NA	NA	NA	0.807	NA	0.920	NA	NA