Ecography

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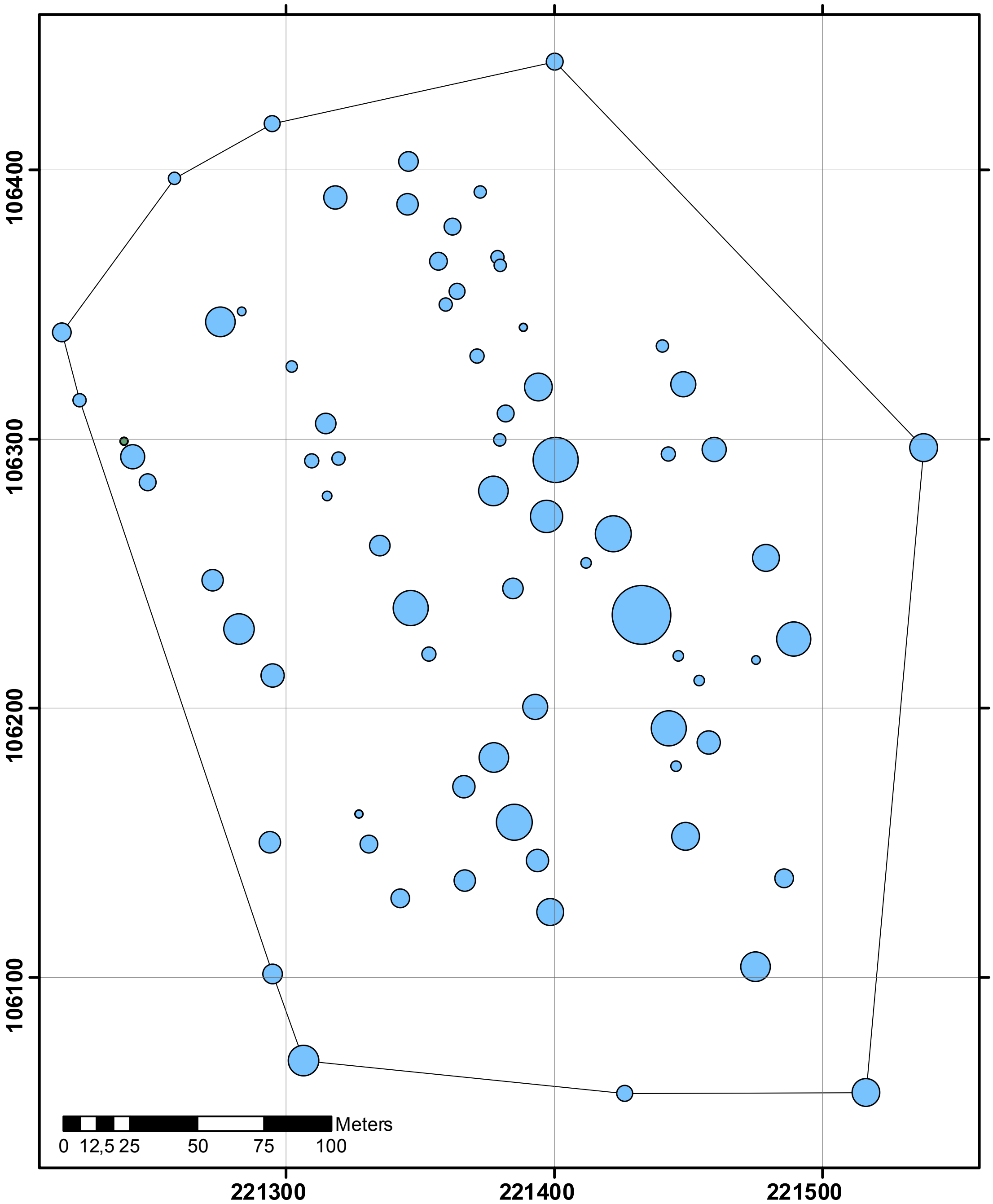
Supplementary material

Appendix 1: Picture of the crested newt (*Triturus cristatus*), a biphasic amphibian that shows habitat supplementation (i.e., inter-pond change) during and between breeding seasons. The picture represents a female from Marche-en-Famenne (Belgium). Photo: Mathieu Denoël.

Appendix 2. Map showing the location of ponds with capture/recapture of crested newts (*Triturus cristatus*) in Marche-en-Famenne (Belgium). The size of dots is proportional to the mean surface area of ponds (10 – 594 m²). The black line represents the minimum convex polygon of the study area. The same newts can use ponds at the different sides of the studied area and therefore the size of studied area is within their usual walking distance. Coordinates refers to Belgian Lambert 1972. The access to the study site is forbidden without authorization because of lethal risk due to military operations.



Appendix 3: Sessions of samplings and number of marked and recaptured crested newts (*Triturus cristatus*) per session.

Session	year	Period	New marked newts	Recaptured newts
1	2010	1/3 – 2/4	200	0
2	2010	7/4 – 29/4	314	152
3	2010	28/4 – 20/5	130	356
4	2010	25/5 – 11/06	65	406
5	2010	11/6 – 24/6	28	268
6	2011	2/3 – 10/3	14	172
7	2011	14/3 – 21/3	22	66
8	2011	28/3 – 5/4	102	305
9	2011	12/4 – 20/4	9	425
10	2011	28/4 – 3/5	49	415
11	2011	13/5 – 16/5	2	373
12	2011	28/5 – 31/5	10	274
13	2011	13/6 – 15/6	1	215
14	2011	27/6 - 29/6	0	185
15	2012	14/3 – 14/4	0	304
16	2012	17/4 – 15/5	0	240

Appendix 4: Model with correlated successive movement ('memory effect'): model selection procedure. r = probability of being site faithful, ϕ survival probability, α = probability of remaining in the same site between t and t-1, p = recapture probability, CST = constant, SEX = sex, T = time-specific effect, MEMORY = individual past dispersal status (mover or stayer), AICc = Akaike criterion adjusted for small sample size, w = AICc weight, k = number of parameters. We conducted a sequential model selection procedure. We first modeled recapture probability (p) and tested whether it varied between sexes (SEX), year (YEAR) or was constant (CST). We then kept the best effect on recapture probability based on AICc values (the model with the lowest AICc among the different models testing covariates on recapture probabilities), and we then tested whether the site fidelity probability (α) at time t depended on individual fidelity status at time t-1 by comparing the relative support of a model including a memory effect [r(CST), ϕ(CST), α(MEMORY + T), and p(SEX)] and a model without memory effect [r(CST), ϕ(CST), α(T), and p(SEX)].

Model definition	w	k	AICc	ΔAICc
Site fidelity and memory effect				
r(CST), ϕ(CST), α(MEMORY + T), p(SEX)	1.00	20	16094.24	0.00
r(CST), ϕ(CST), α(T), p(SEX)	0.00	18	16184.57	90.33
Recapture probability				
r(CST), ϕ(CST), α(T), p(SEX)	1.00	18	16184.57	0.00
r(CST), ϕ(CST), α(T), p(CST)	0.00	17	16197.48	12.91
r(CST), ϕ(CST), α(T), p(YEAR)	0.00	19	16203.34	18.77

Appendix 5: Models with a mixture of two strategies ('heterogeneity effect'): Model selection procedure. r = probability of being site faithful, ϕ survival probability, α = probability of remaining in the same site between t and t-1, p = recapture probability, CST = constant, HET = two heterogeneity mixtures (site faithful vs unfaithful individuals), T = time-specific effect, AICc = Akaike criterion adjusted for small sample size, w = AICc weight, k = number of parameters. As the number of models to test was extremely large given the number of combinations with all covariates, we conducted a sequential model selection procedure. We first modeled recapture probability (p) and tested whether it varied between sexes (SEX), year (YEAR) or was constant (CST). Then, we modeled individual heterogeneity in both survival (ϕ) and site fidelity behavior (α); for that purpose, we included heterogeneity mixture in the two parameters. Next, we tested whether the probability of being assigned to one of the two site faithful phenotypes (r) depended on three factors: (1) sex (SEX), (2) body size (SVL), and (3) the mean surface of the ponds occupied by the individual during the three years of study (SURF). The same hypotheses were then tested on survival. For both phenotype assignment and survival probabilities, we tested all possible combinations of the two variables that were included in an additive way. In addition, we considered interactions between SEX and SVL and between SEX and SURF.

Model definition	w	k	AICc	ΔAICc
r(SEX + SVL + SURF), ϕ(HET + SURF + SVL), α(HET + T), p(SEX)	0.57	26	16064.13	0.00
r(SEX + SVL + SURF), ϕ(HET + SURF + SEX × SVL), α(HET + T), p(SEX)	0.22	27	16066.05	1.92
r(SEX + SVL + SURF), ϕ(HET + SURF × SEX + SVL × SEX), α(HET + T), p(SEX)	0.12	28	16067.27	3.14
r(SEX + SVL + SURF), ϕ(HET + SURF), α(HET + T), p(SEX)	0.04	25	16069.41	5.28
r(SEX + SVL + SURF), ϕ(HET + SURF × SEX), α(HET + T), p(SEX)	0.03	26	16070.24	6.11
r(SEX + SVL + SURF), ϕ(HET + SVL + SEX), α(HET + T), p(SEX)	0.01	26	16072.42	8.29
r(SEX + SVL + SURF), ϕ(HET + SVL × SEX), α(HET + T), p(SEX)	0.00	26	16074.06	9.93
r(SEX + SVL + SURF), ϕ(HET + SVL), α(HET + T), p(SEX)	0.00	27	16076.12	11.99
r(SEX + SVL + SURF), ϕ(HET +SURF + SEX), α(HET + T), p(SEX)	0.00	27	16082.04	17.91
r(SEX + SVL + SURF), ϕ(HET + SEX), α(HET + T), p(SEX)	0.00	26	16083.05	18.92
r(SEX + SVL + SURF), ϕ(HET), α(HET + T), p(SEX)	0.00	25	16083.45	19.32
r(SEX + SVL), ϕ(HET), α(HET + T), p(SEX)	0.00	23	16085.13	21.00
r(SVL + SURF), ϕ(HET), α(HET + T), p(SEX)	0.00	23	16093.23	29.10
r(SEX × SVL + SURF), ϕ(HET), α(HET + T), p(SEX)	0.00	24	16094.53	30.40
r(SEX + SURF × SVL), ϕ(HET), α(HET + T), p(SEX)	0.00	24	16094.97	30.84
r(SEX×SVL + SEX×SURF), ϕ(HET), α(HET + T), p(SEX)	0.00	25	16096.49	32.36
r(SURF), ϕ(HET), α(HET + T), p(SEX)	0.00	22	16096.15	32.02
r(SEX), ϕ(HET), α(HET + T), p(SEX)	0.00	22	16096.88	32.75
r(SVL), ϕ(HET), α(HET + T), p(SEX)	0.00	22	16101.98	37.85
r(CST), ϕ(HET), α(HET + T), p(SEX)	0.00	21	16106.35	42.22
Heterogeneity on survival and site fidelity				
r(CST), ϕ(HET), α(HET + T), p(SEX)	1.00	21	16106.35	0.00
r(CST), ϕ(CST), α(HET + T), p(SEX)	0.00	20	16122.87	16.52
r(CST), ϕ(HET), α(T), p(SEX)	0.00	19	16172.46	66.11
r(CST), ϕ(CST), α(CST), p(SEX)	0.00	18	16184.57	78.22
Recapture				
r(CST), ϕ(CST), α(T), p(SEX)	1.00	18	16184.57	0.00
r(CST), ϕ(CST), α(T), p(CST)	0.00	17	16197.48	12.91
r(CST), ϕ(CST), α(T), p(YEAR)	0.00	19	16203.34	18.77