

Table S1 Models within two Akaike Information Criterion (AIC) units of the top model for estimating occupancy (ψ), colonization (g), extirpation (ϵ) and detection (p) probabilities for (a) *Squalius lucumonis*, (b) *Telestes muticellus*, (c) *Padogobius nigricans*.

| (a) | Model | AIC | Delta AIC | AIC weight | Model Likelihood | n.Par. | -2*LogLike |
|-----|---|--------|-----------|------------|------------------|--------|------------|
| | $\psi, \gamma (), \epsilon$ (season*elevation), $p ()$ | 448.58 | 0.00 | 0.243 | 1.000 | 7 | 434.58 |
| | ψ (season*river fragmentation degree), $\epsilon (), p ()$ | 448.94 | 0.36 | 0.203 | 0.835 | 7 | 434.94 |
| | $\psi, \gamma (), \epsilon (), p$ (year) | 449.96 | 1.38 | 0.122 | 0.502 | 7 | 435.96 |

| (b) | Model | AIC | Delta AIC | AIC weight | Model likelihood | n.Par. | -2*LogLike |
|-----|--|--------|-----------|------------|------------------|--------|------------|
| | $\psi, \gamma (), \epsilon (), p$ (yr) | 516.49 | 0.00 | 0.208 | 1.000 | 7 | 502.49 |
| | ψ (season*elevation), $\gamma (), p ()$ | 517.13 | 0.64 | 0.151 | 0.726 | 7 | 503.13 |
| | $\psi, \gamma (), \epsilon$ (river fragmentation degree), $p ()$ | 517.32 | 0.83 | 0.137 | 0.660 | 7 | 503.32 |
| | $\psi, \gamma (), \epsilon$ (elevation), $p ()$ | 517.76 | 1.27 | 0.110 | 0.530 | 7 | 503.76 |
| | ψ, γ (river fragmentation degree), $\epsilon (), p()$ | 518.30 | 1.81 | 0.084 | 0.405 | 7 | 504.30 |

| (c) | Model | AIC | Delta AIC | AIC weight | Model Likelihood | n.Par. | -2*LogLike |
|-----|--|--------|-----------|------------|------------------|--------|------------|
| | ψ, γ (river fragmentation degree), $p ()$ | 442.97 | 0.00 | 0.206 | 1.000 | 7 | 428.97 |
| | ψ, γ (elevation), $\epsilon (), p ()$ | 443.12 | 0.15 | 0.191 | 0.928 | 7 | 429.12 |
| | $\psi, \gamma (), \epsilon$ (elevation), $p ()$ | 443.42 | 0.45 | 0.164 | 0.799 | 7 | 429.42 |
| | ψ, γ (season, river fragmentation degree), $\epsilon (), p ()$ | 444.97 | 2.00 | 0.076 | 0.368 | 8 | 428.97 |