Supplementary materials.

We examined the literature to find information on spatial patterns relating to extra-pair paternity for the species we modeled; no data were found for the winter wren. Because these species were chosen based solely on the availability of data on per-brood extra-pair paternity, they may represent a fairly random subset of passerines with respect to spatial patterns of extra-pair copulation. We preferentially report data from the same study or population, where possible, from which data on *m* and *s* were drawn. We categorized extra-pair sires according to how distant they were from their extra-pair young.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table S1.** Summary of spatial constraints on extra-pair copulations in species used as the basis for simulations. | | | | | | | | |
| species (n young (Y) or broods (B)) | % not assigned to a known male | % of assigned extra-pair sires (S) or extra-pair young (Y) with sires belonging to this distance category | | | | |  | |
| first order | ≤ second order | ≤ third order | “local” | non-local, assigned | comments |
| banded wren (Cramer et al. 2011), n = 5 B | 20% (1/5 B) | 100%  (4/4 S) |  |  |  |  |  |
| pied flycatcher (Lehtonen et al. 2009), n = 38 Y | 47.4% (18/38 Y) |  | 41.6% (5/12 S) |  | 100% (12/12 S) |  |  |
| great tit (García-Navas et al. 2015), n = 26 B, 62 Y | 46.7% (29/62 Y) | 10.5% (2/19 S) | 15.8% (3/19 S) |  | 57.9% (11/19 S) | 42% (8/19 S) | inferred from table 1, using 30 m distance between nest boxes to infer neighbor status |
| blue tit (Charmantier and Perret 2004), n = 22 B (2002 data) | 13.4% (3/22 B) | 47% (9/19 S) | 57.9% (11/19 S) | 63.2% (12/19 S) |  |  | description by neighbor degree is ours, interpreted from their Figure 1. |
| house wren (LaBarbera et al. 2010), n = 62 S, 44 B | about 16.4% Y \* | 58.1 (36/62 S) | 90.3 (56/62 S) |  | 100% (62/62 S) |  | \* unassigned offspring not given in paper; value is from a different year of same study population |
| house martins (Whittingham and Lifjeld 1995) n = 7 B, 20 Y | 0% |  |  |  | 100% |  | no attempts to describe neighbor level; colonial breeders |
| collared flycatcher (Edme et al. 2016)  n = 181 Y | 37% (67/181 Y) | 16% S | 42% | 67% | 84.7% (50/59 S) |  | values estimated from Fig 2, with 40 m spacing between boxes |
| bluethroat (Johnsen et al. 1998) n = 96 Y | 56.3% (54/96 Y) | 76.2% (32/42 Y) |  | 100% (42/42 Y) |  |  |  |
| hooded warbler (Stutchbury et al. 1994) n = 8 B | 12.5 (1/8 B) | 100% (7/7 S) |  |  |  |  |  |
| willow warbler (Gil et al. 2007), n = 16 B | 68.8 (11/16 B) | 20% (1/5 S) | 40% (2/5 S) | 60% (3/5 S) | 100% (5/5 S) |  |  |
| yellow warbler (Yezerinac et al. 1995), n = 53 B | 67.9% (36/53 B) | 58.8% (10/17 S) | 94.1% (16/17 S) | 100% (17/17 S) |  |  | low genotyping rate for one year may partly explain one year’s low assignment of sires |
| black-throated blue warbler (Webster et al. 2001), n = 66 Y | 62.1% (41/66 Y) | 68% (17/25 Y) | 84% (21/25 Y) | 92% (23/25 Y) | 100% (25/25 Y) |  | 70.2% of EPY with unassigned sires were on edge of study plot |
| tree swallow (Kempenaers et al. 2001), n = 16 B, 53 Y | 34% (18/53 Y) |  |  |  | 47% (25/53 Y) | 19% (10/53 Y) | known floater males included in “non local, assigned” |
| reed bunting (Mayer and Pasinelli 2013), n = 102 B | 19.2% (23/120 S) | 68.2% (60/88 S) | 89.8% (79/88 S) |  | 98.9% (87/88 S) | 1% (1/88 S) |  |

We express the cumulative percentage of identified EP sires closer than a given distance class; some papers lump distance categories together, resulting in apparent missing data above. As indicated in the “comments” column, we sometimes inferred neighbor relationships from other information given in the paper, for ease of comparing across species. The designation “local” followed the original authors’ descriptions, and was used here only when more detailed information on location was unavailable.

**Literature Cited**

Charmantier A, Perret P. 2004. Manipulation of nest-box density affects extra-pair paternity in a population of blue tits (*Parus caeruleus*). Behav Ecol Sociobiol 56:360–365.

Cramer ERA, Hall ML, de Kort SR, Lovette IJ, Vehrencamp SL. 2011. Infrequent extra-pair paternity in the banded wren, a synchronously breeding tropical passerine. Condor 113:637–645.

Edme A, Munclinger P, Krist M. 2016. Female collared flycatchers choose neighbouring and older extra-pair partners from the pool of males around their nests. J Avian Biol 47:552–562.

García-Navas V, Ferrer ES, Cáliz-Campal C, Bueno-Enciso J, Barrientos R, Sanz JJ, Ortego J. 2015. Spatiotemporal and genetic contingency of extrapair behaviour in a songbird. Anim Behav 106:157–169.

Gil D, Slater PJB, Graves JA. 2007. Extra-pair paternity and song characteristics in the willow warbler *Phylloscopus trochilus*. J Avian Biol 38:291–297.

Johnsen A, Andersson S, Örnbort J, Lifjeld JT. 1998. Ultraviolet plumage ornamentation affects social mate choice and sperm competition in bluethroats (Aves: *Luscinia s . svecica*): a field experiment. Proc R Soc B 265:1313–1318.

Kempenaers B, Everding S, Bishop C, Boag P, Robertson RJ. 2001. Extra-pair paternity and the reproductive role of male floaters in the tree swallow (*Tachycineta bicolor*). Behav Ecol Sociobiol 49:251–259.

LaBarbera K, Llambias PE, Cramer ERA, Schaming TD, Lovette IJ. 2010. Synchrony does not explain extrapair paternity rate variation in northern or southern house wrens. Behav Ecol 21:773–780.

Lehtonen PK, Primmer CR, Laaksonen T. 2009. Different traits affect gain of extrapair paternity and loss of paternity in the pied flycatcher, *Ficedula hypoleuca*. Anim Behav 77:1103–1110.

Mayer C, Pasinelli G. 2013. New support for an old hypothesis: Density affects extra-pair paternity. Ecol Evol 3:694–705.

Stutchbury BJM, Rhymer J, Morten E. 1994. Extrapair paternity in hooded warblers. Behav Ecol 5:384–392.

Webster MS, Chuang-Dobbs HC, Holmes RT. 2001. Microsatellite identification of extrapair sires in a socially monogamous warbler. Behav Ecol 12:439–446.

Whittingham LA, Lifjeld JT. 1995. Extra-pair fertilizations increase the opportunity for sexual selection in the monogamous house martin *Delichon urbica*. J Avian Biol 26:283–288.

Yezerinac SM, Weatherhead PJ, Boag PT. 1995. Extra-pair paternity and the opportunity for sexual selection in a socially monogamous bird (*Dendroica petechia*). Behav Ecol Sociobiol 37:179–188.