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.

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| **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.

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