

MOLECULAR ECOLOGY

Supplemental Information for:

Late Pleistocene landscape changes and habitat specialization as promoters of population genomic divergence in Amazonian floodplain birds

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27 **Table S1.** List of samples used in the study for each species with the respective sample ID, institution, location, sub-basin / river
 28 section, geographic reference from longitude and latitude (in decimal degrees). Institutions: Academy of Natural Science of Drexel
 29 University (ANSP), Instituto Nacional de Pesquisas da Amazônia (INPA), Louisiana Museum of Natural Science (LSUM),
 30 Universidade Federal de Pernambuco (UFPE), Museu Paraense Emílio Goledi (MPEG), and Coleções de Aves Hertiano Zenaide,
 31 Universidade Federal da Paraíba (CAHZ).

Taxon	Sample ID	Institution	Locality	Sub-basin / river section	Lat/Long
<i>Stigmatura napensis napensis</i>	17725	ANSP	Napo, ca. 10 river km below junction of Rio Lagarto & Rio Aguarico	Napo	-1.0333, -77.8500
<i>Stigmatura napensis napensis</i>	19369	ANSP	Napo, Rio Napo; island at mouth of Rio Aguarico	Napo	-1.0333, -77.8500
<i>Stigmatura napensis napensis</i>	3638	LSU	Peru: Loreto, S bank of Isla de Iquitos	Upper Solimões	-3.8756, -73.2197
<i>Stigmatura napensis napensis</i>	3639	LSU	Peru: Loreto, S bank of Isla de Iquitos	Upper Solimões	-3.8756, -73.2197
<i>Stigmatura napensis napensis</i>	43079	LSU	River island in Rio Maranon at mouth of Rio Morona, Loreto Department, Peru	Maranon	-4.7497, -77.1300
<i>Stigmatura napensis napensis</i>	7240	LSU	Isla Pasto, Rio Amazonas opposite Aysana, ca 80 km BE Iquitos; NA; Loreto; Peru	Upper Solimões	-3.4730, -72.6760
<i>Stigmatura napensis napensis</i>	89188	LSU	Isla Setical, 13.9 km NW Atalaya; Atalaya; Ucayali; PERU	Ucayali	-10.6419, -73.8408
<i>Stigmatura napensis napensis</i>	89217	LSU	Isla Setical, 13.9 km NW Atalaya; Atalaya; Ucayali; PERU	Ucayali	-10.6419, -73.8408
<i>Stigmatura napensis napensis</i>	89218	LSU	Isla Setical, 13.9 km NW Atalaya; Atalaya; Ucayali; PERU	Ucayali	-10.6419, -73.8408
<i>Stigmatura napensis napensis</i>	A027	INPA	Rio Somlimões, margem direita, ca 12 km NW Jutaí	Lower Solimões	-2.6806, -66.8611
<i>Stigmatura napensis napensis</i>	A028	INPA	Rio Somlimões, margem direita, ca 12 km NW Jutaí	Lower Solimões	-2.6806, -66.8611
<i>Stigmatura napensis napensis</i>	A1033	INPA	Rio Branco, Ilha do Marari	Branco	1.4993, -61.2527

<i>Stigmatura napensis napensis</i>	A14198	INPA	Margem esquerda do baixo Rio Branco, ca 320 km S Caracaráí	Branco	-1.0047, -61.8812
<i>Stigmatura napensis napensis</i>	A15092	INPA	Resex Tapajós-Arapiuns; margem esquerda do Rio Tapajós; ca 33 km N Aveiro; "Comunidade Cameté"	Tapajós	-3.3000, -55.2833
<i>Stigmatura napensis napensis</i>	A15126	INPA	Resex Tapajós-Arapiuns; margem esquerda do Rio Tapajós; ca 33 km N Aveiro; "Comunidade Cameté"	Tapajós	-3.3167, -55.3333
<i>Stigmatura napensis napensis</i>	A15923	INPA	Baixo Rio Branco, ca 225 km S Caracaráí	Branco	-0.0496, -61.8074
<i>Stigmatura napensis napensis</i>	A15960	INPA	Rio Amazonas; ca 70 m W Itacoatiara; ilha em frente "Novo Remanso"	Lower Solimões	-3.2400, -59.0603
<i>Stigmatura napensis napensis</i>	A2166	INPA	Caracaráí; Vista Alegre; Ilha do Pascoal; Rio Branco; ca 26 Km W da base do Parque Nacional do Viruá	Branco	1.4673, -61.2536
<i>Stigmatura napensis napensis</i>	A23482	INPA	RDS Mamirauá ca. 40km NNW Tefé, Paraná da Vila Alencar	Lower Solimões	-3.0961, -64.7570
<i>Stigmatura napensis napensis</i>	A23483	INPA	RDS Mamirauá ca. 40km NNW Tefé, Paraná da Vila Alencar	Lower Solimões	-3.0961, -64.7570
<i>Stigmatura napensis napensis</i>	A23703	INPA	Rio Solimões, ca 15 Km W Codajás, Ilha Grande, Canal do Juanico	Lower Solimões	-3.8133, -62.1964
<i>Stigmatura napensis napensis</i>	A23711	INPA	Rio Solimões, ca 15 Km W Codajás, Ilha Grande, Canal do Juanico	Lower Solimões	-3.8133, -62.1964
<i>Stigmatura napensis napensis</i>	A23892	INPA	Rio Solimões, Ilha Nova de Santana, cerca de 30 km SW Manacapurú	Lower Solimões	-3.5421, -60.8040
<i>Stigmatura napensis napensis</i>	A23895	INPA	Rio Solimões, Ilha Nova de Santana, cerca de 30 km SW Manacapurú	Lower Solimões	-3.5421, -60.8040
<i>Stigmatura napensis napensis</i>	A8280	INPA	Ilha no Rio Branco; ca 30 km S Caracaráí	Branco	1.5261, -61.2467
<i>Stigmatura napensis napensis</i>	A8330	INPA	Ilha fluvial no Rio Branco; ca 150 km S de Caracaráí	Branco	0.5075, -61.6647
<i>Stigmatura napensis napensis</i>	A8385	INPA	Ilha no Rio Branco; ca 315 km S Caracaráí	Branco	-1.0244, -61.8756
<i>Stigmatura napensis napensis</i>	T16303	MPEG	Borba, Auarazinho, margem leste Rio Madeira	Madeira	-4.3825, -59.7517

<i>Stigmatura napensis napensis</i>	T16335	MPEG	Borba, Puruzinho, Ilha	Madeira	-4.1283, -59.3653
<i>Stigmatura napensis bahiae</i>	T21579	MPEG	São Raimundo Nonato, PN Serra da Capivara, Projeto Fontenele	Caatinga Biome	-8.8531, -42.6333
<i>Stigmatura napensis bahiae</i>	T25197	MPEG	São Raimundo Nonato, PN Serra da Capivara, Comunidade Onça	Caatinga Biome	-8.8531, -42.6333
<i>Mazaria propinqua</i>	43070	LSU	Peru: Loreto, River Island in Rio Marañon at mouth of Rio Morona	Marañon	-4.7497, -77.0633
<i>Mazaria propinqua</i>	43083	LSU	Peru: Loreto, River Island in Rio Marañon at mouth of Rio Morona	Marañon	-4.7497, -77.0633
<i>Mazaria propinqua</i>	7289	LSU	Isla Pasto, Rio Amazonas opposite Aysana, ca 80 km BE Iquitos; NA; Loreto; Peru	Upper Solimões	-3.4730, -72.6760
<i>Mazaria propinqua</i>	7331	LSU	AMAZONAS I. PASTO 80KM NE IQUIT. 80M; NA; Loreto; Peru	Upper Solimões	-3.5167, -72.5167
<i>Mazaria propinqua</i>	79791	LSU	river island at confluence of Rios Beni & Madre de Dios; Vaca Diez; Beni; Bolivia	Madre de Dios	-10.9919, -66.0831
<i>Mazaria propinqua</i>	79801	LSU	San Lorenzo de Pampa; Vaca Diez; Beni; Bolivia	Madre de Dios	-11.1819, -65.7628
<i>Mazaria propinqua</i>	89182	LSU	Isla Setical, 13.9 km NW Atalaya; Atalaya; Ucayali; PERU	Ucayali	-10.6419, -73.8408
<i>Mazaria propinqua</i>	89264	LSU	Isla del Gallo, 7.2 km NW Atalaya; Atalaya; Ucayali; PERU	Ucayali	-10.6750, -73.7969
<i>Mazaria propinqua</i>	A1025	INPA	Ilha do Marari, Rio Branco	Branco	1.5483, -61.2553
<i>Mazaria propinqua</i>	A18287	INPA	Margem esquerda do Rio Japurá, ca 50 km SE Vila Bittencourt; "Comunidade Taboca"	Japurá	-1.7167, -69.1167
<i>Mazaria propinqua</i>	A2158	INPA	Caracará; Vista Alegre; Trilha Aliança; margem esquerda do Rio Branco; ca 30 Km da base do Parque Nacional do Viruá	Branco	1.5576, -61.2489
<i>Mazaria propinqua</i>	A23479	INPA	RDS Mamirauá ca. 40km NNW Tefé, Paraná da Vila Alencar	Lower Solimões	-3.0961, -64.7570
<i>Mazaria propinqua</i>	A23707	INPA	Rio Solimões, ca 15 Km W Codajás, Ilha Grande, Canal do Juanico	Lower Solimões	-3.8132, -62.1962
<i>Mazaria propinqua</i>	A23708	INPA	Rio Solimões, ca 15 Km W Codajás, Ilha Grande, Canal do Juanico	Lower Solimões	-3.8132, -62.1962

<i>Mazaria propinqua</i>	A23872	INPA	Rio Solimões, Ilha Nova de Santana, cerca de 30 km SW Manacapuru	Lower Solimões	-3.5421, -60.8040
<i>Mazaria propinqua</i>	A23886	INPA	Rio Solimões, Ilha Nova de Santana, cerca de 30 km SW Manacapuru	Lower Solimões	-3.5421, -60.8040
<i>Mazaria propinqua</i>	A8309	INPA	Ilha fluvial no Rio Branco; ca 80 km de Caracará	Branco	1.1665, -61.3341
<i>Mazaria propinqua</i>	A8345	INPA	Ilha no Rio Branco; ca 180 km S Caracará	Branco	0.2664, -61.7653
<i>Mazaria propinqua</i>	T1027	UFPE	RR: ilha no Rio Branco; ca. 40 km S Caracará	Branco	1.4820, -61.253
<i>Mazaria propinqua</i>	T760	UFPE	RR: ilha no Rio Branco, ~100 km ao N da confluência com o Rio Negro	Branco	-0.6155, -61.8132
<i>Mazaria propinqua</i>	T763	UFPE	RR: ilha no Rio Branco, ~100 km ao N da confluência com o Rio Negro	Branco	-0.6155, -61.8132
<i>Mazaria propinqua</i>	T765	UFPE	RR: ilha no Rio Branco, ~100 km ao N da confluência com o Rio Negro	Branco	-0.6138, -61.8122
<i>Mazaria propinqua</i>	T767	UFPE	RR: ilha no Rio Branco; ca. 40 km S Caracará	Branco	1.4820, -61.253
<i>Conirostrum bicolor minus</i>	A1043	INPA	Rio Branco. ilhas na boca do Rio Anauá	Branco	0.9847, -61.3413
<i>Conirostrum bicolor minus</i>	A1341	INPA	Rio Japurá; Ilha do Cururu; ca. 75km NNW Tefé	Japurá	-2.8760, -64.9193
<i>Conirostrum bicolor minus</i>	A18065	INPA	Ilha no Rio Japurá; ca 68 km SE Vila Bittencourt; "Ilha da Ponta Nova"	Japurá	-1.7925, -68.8189
<i>Conirostrum bicolor minus</i>	A2156	INPA	Caracará; Vista Alegre; Trilha Aliança; margem esquerda do Rio Branco; ca 30 Km da base do Parque Nacional do Viruá	Branco	1.7207, -61.1675
<i>Conirostrum bicolor minus</i>	A23424	INPA	RDS Mamirauá ca. 40km NNW Tefé próximo a comunidade da Boca do Mamirauá	Solimões	-3.1249, -64.7756
<i>Conirostrum bicolor minus</i>	A23757	INPA	Rio Solimões. ca 15 Km W Codajás. Ilha Grande. Canal do Juanico	Solimões	-3.8134, -62.1964
<i>Conirostrum bicolor minus</i>	A23876	INPA	Rio Solimões. Ilha Nova de Santana. cerca de 30 km SW Manacapuru	Solimões	-3.3830, -60.7258
<i>Conirostrum bicolor minus</i>	A23989	INPA	PA: margem direita R. Amazonas. ca. 22 km NW Santarém; Igarapé do Arapixuna	Amazonas	-2.2197, -54.7548
<i>Conirostrum bicolor minus</i>	A8273	INPA	Ilha Ajarani no Rio Branco; ca 30 km S Caracará	Branco	1.5497, -61.2500

<i>Conirostrum bicolor minus</i>	A8279	INPA	Ilha no Rio Branco; ca 30 km S Caracaraí	Branco	1.6773, -61.2001
<i>Conirostrum bicolor minus</i>	B7282	LSU	Isla Pasto. Rio Amazonas opposite Aysana. ca 80 km BE Iquitos. Loreto Department. Peru	Solimões	-3.4580, -72.6750
<i>Conirostrum bicolor minus</i>	T1161	UFPE	RR: Ilha no Rio Branco; ca. 35 km S Caracaraí	Branco	1.4313, -61.2791
<i>Conirostrum bicolor minus</i>	T25522	MPEG	Amazonas: St antonio do Içá. ilha porto América	Amazonas	-3.1086, -67.9645
<i>Conirostrum bicolor minus</i>	T25524	MPEG	Amazonas: St antonio do Içá. ilha porto América	Amazonas	-3.1086, -67.9645
<i>Conirostrum bicolor minus</i>	T611	UFPE	RR: ilha no Rio Branco. ca 120 km S Caracaraí	Branco	0.7671, -61.4816
<i>Conirostrum bicolor bicolor</i>	KU5690	UFPE	Guiana	-	8.3799, -59.3069
<i>Conirostrum bicolor bicolor</i>	MAM11	CAHZ	Brazil: PB; Barra de Mamanguape	-	-6.7839, -34.9205
<i>Conirostrum bicolor bicolor</i>	MAM16	CAHZ	Brazil: PB; Barra de Mamanguape	-	-6.7839, -34.9205
<i>Conirostrum bicolor bicolor</i>	T1737	MPEG	Brazil: PI; Barra Grande, Cajueiro da Praia	-	-2.9112, -44.4190

33 **Table S2.** Mean values and 95% confidence interval of the parameters current effective population size (N_e), migration rate per
 34 generation (m), and mean and standard deviation (sd) of mutation rate (μ) of UCEs and exons, estimated for the population pairs of the
 35 Rio Branco (Bran) and Amazon River and its tributaries (Amaz) from the best demographic model (Model 3) simulated in
 36 *PipeMaster*.

<i>Stigmatura n. napensis</i>						
	Ne_Amaz	Ne_Bran	m_AmazBran	m_BranAmaz	mean μ rate	sd μ rate
Min.:	58033	24642	0.1432	0.2693	4.62E-11	4.77E-10
Weighted 2.5 % Perc.:	119001	76046	0.3658	0.4192	2.01E-10	1.48E-10
Weighted Median:	123795	156053	1.3957	1.6970	3.66E-10	4.87E-10
Weighted Mean:	178549	185935	1.3331	1.7438	4.06E-10	4.97E-10
Weighted Mode:	133408	57220	1.8118	2.1494	9.01E-11	1.50E-10
Weighted 97.5 % Perc.:	375883	417053	2.0539	2.2929	9.70E-10	1.22E-09
Max.:	570914	587497	2.1546	2.3686	1.24E-09	1.65E-09
<i>Mazaria propinqua</i>						
	Ne_Amaz	Ne_Bran	m_AmazBran	m_BranAmaz	mean μ rate	sd μ rate
Min.:	5749	35	0.1799	0.1381	7.93E-11	9.99E-11
Weighted 2.5 % Perc.:	114665	96068	0.4225	0.3786	1.31E-11	2.32E-10
Weighted Median:	350501	325197	1.2998	1.3159	5.51E-10	5.75E-10
Weighted Mean:	351148	321194	1.2554	1.2344	5.23E-10	5.90E-10
Weighted Mode:	377162	152481	1.6450	1.6836	7.76E-10	3.76E-10
Weighted 97.5 % Perc.:	587873	573691	1.9107	1.9050	9.73E-10	1.00E-09
Max.:	646403	702218	1.9779	2.0233	1.08E-09	1.26E-09
<i>Conirostrum b. minus</i>						
	Ne_Amaz	Ne_Bran	m_AmazBran	m_BranAmaz	mean μ rate	sd μ rate
Min.:	27294	4925	0.0904	0.0321	1.01E-10	4.24E-11
Weighted 2.5 % Perc.:	88821	48995	0.1833	0.2156	3.65E-11	1.17E-10
Weighted Median:	246484	150346	1.0692	1.3782	5.44E-10	6.26E-10
Weighted Mean:	256059	157594	1.0622	1.2721	5.06E-10	6.04E-10
Weighted Mode:	223047	119812	1.4805	1.7094	6.91E-10	7.42E-10
Weighted 97.5 % Perc.:	465550	342841	1.8544	1.8397	9.28E-10	9.78E-10
Max.:	515138	470830	1.9527	1.8808	9.80E-10	1.08E-09

38 **Table S3.** Summary statistics of UCE's loci and SNP matrixes for the three studied species

Taxa	UCE Loci*	Total SNPs	Average read depth	1 SNP/UCE
<i>Stigmatura napensis</i>	2,082	8,257	22.6	1,322
<i>Mazaria propinqua</i>	1,983	6,732	22.8	1,384
<i>Conirostrum bicolor</i>	1,761	6,679	21.3	1,071
Mean values	1,942	6,889	22.2	1,402

39 *80% of loci completeness

40

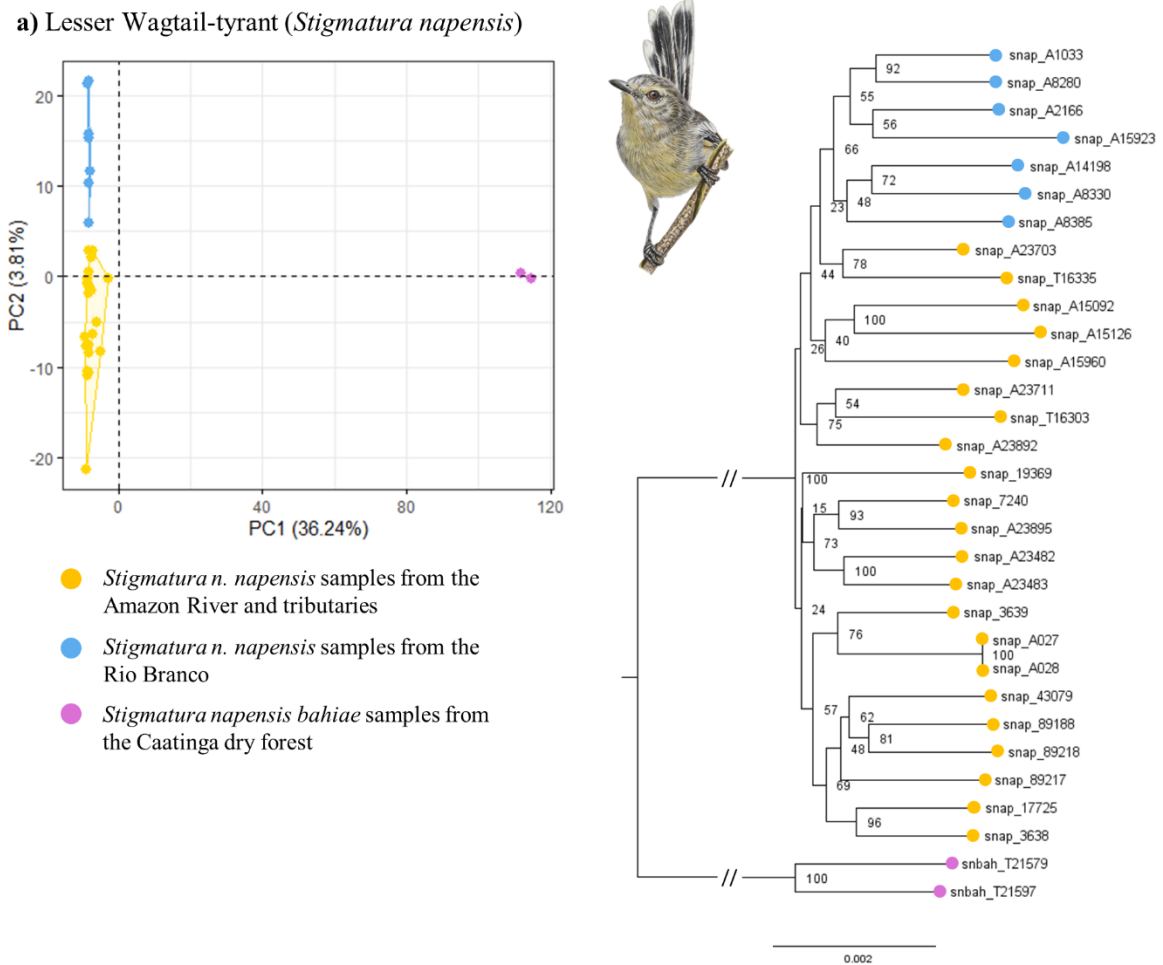
41 **Table S4.** Results of the shared divergence test were analyzed in *ecoevoly*, with the number of divergence events estimated, posterior
42 probability and cumulative posterior probability of each simulated event, and calculation of the prior probability and Bayes' factor.

Number of events	Posterior probability	Cumulative post. probability	Prior probability	Bayes factor
3	< 0.01	1	0.2575	< 0.0291
2	< 0.99	1	0.5138	> 93.6779
1	< 0.01	1	0.2286	< 0.0340

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44

SUPPLEMENTARY FIGURES

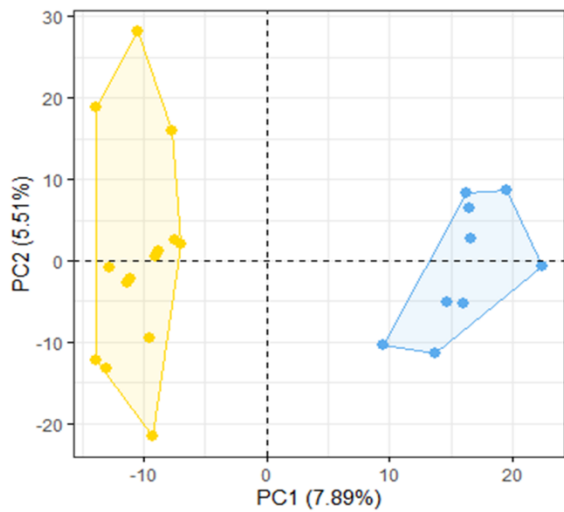


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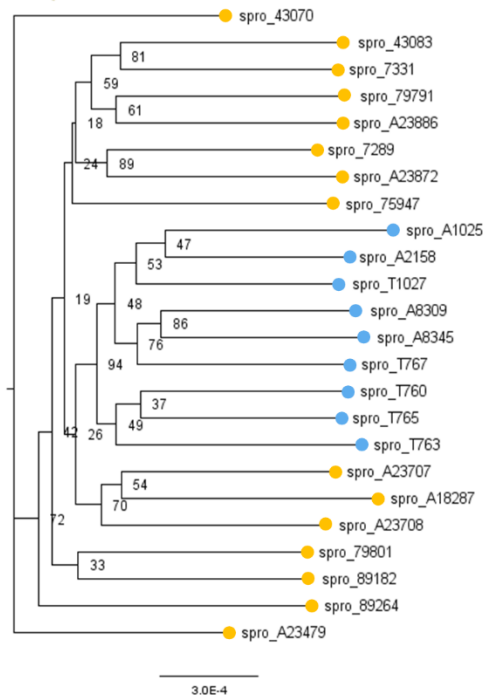
46 **Figure S1.** Evolutionary relationships among populations within Amazonian floodplains and
 47 non-Amazon populations/subspecies (except *Mazaria propinqua*) represented in principal
 48 component analyses and maximum likelihood phylogenetic trees for (a) *Stigmatura napensis*, (b)
 49 *Mazaria propinqua*, and (c) *Conirostrum bicolor*.

50 Figure S1 (Continue...)

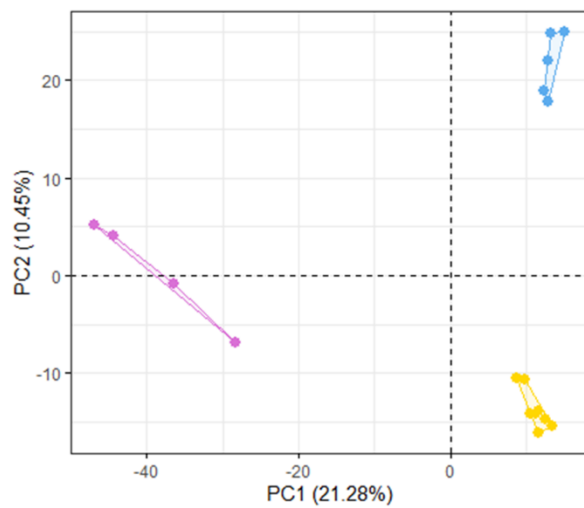
b) White-bellied Spinetail (*Mazaria propinqua*)



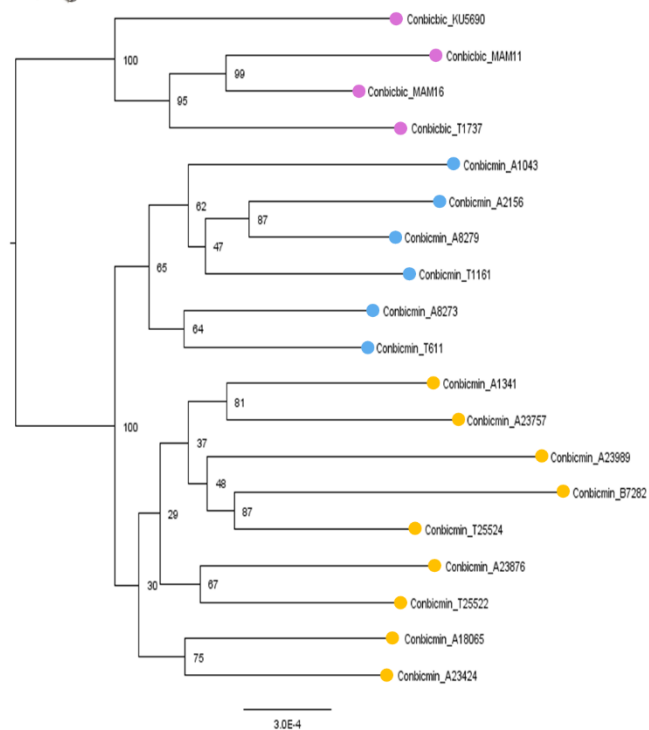
- *Mazaria propinqua* samples from the Amazon River and tributaries
- *Mazaria propinqua* samples from the Rio Branco



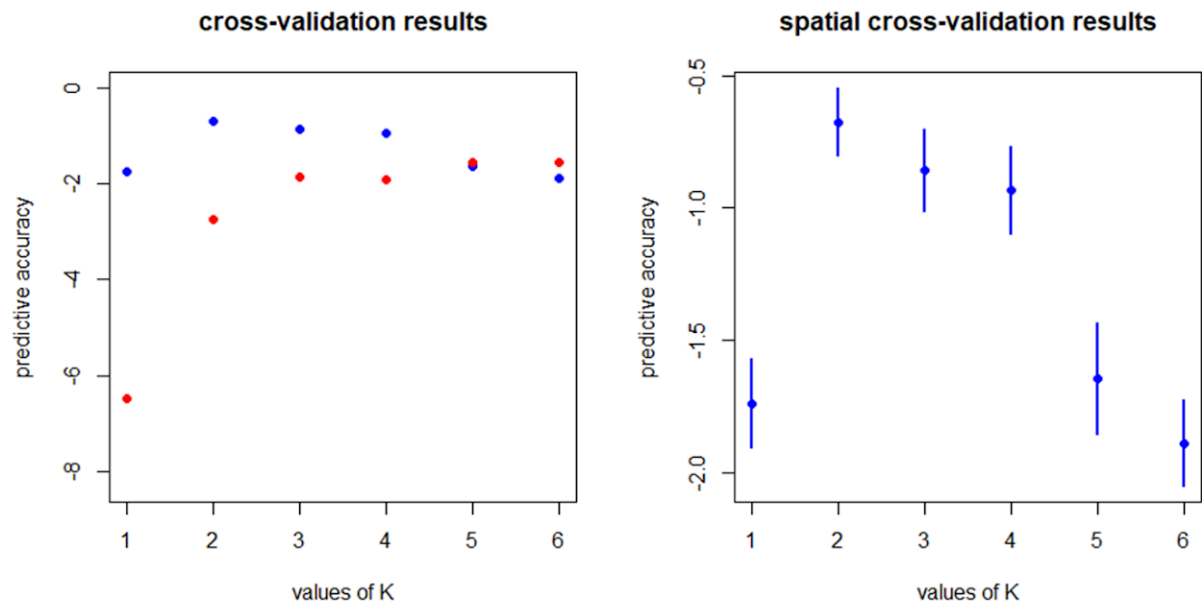
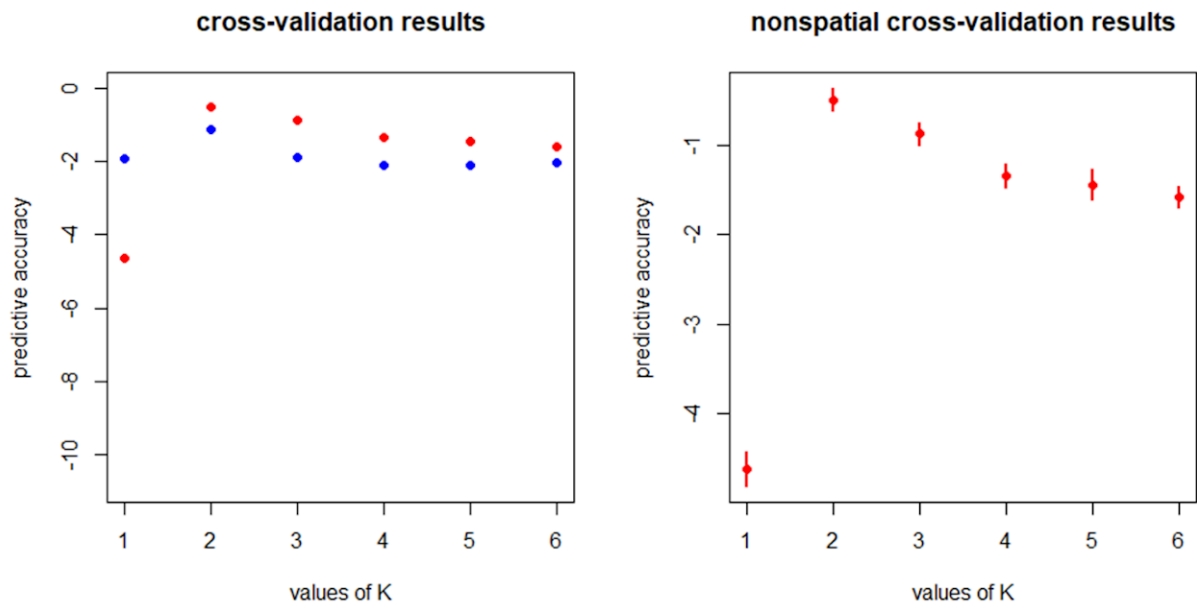
52 Figure S1 (Continue...)

c) Bicolored Conebill (*Conirostrum bicolor*)

- *Conirostrum bicolor minus* samples from the Amazon River and tributaries
- *Conirostrum bicolor minus* samples from the Rio Branco
- *Conirostrum b. bicolor* samples from the Brazilian Eastern Coast

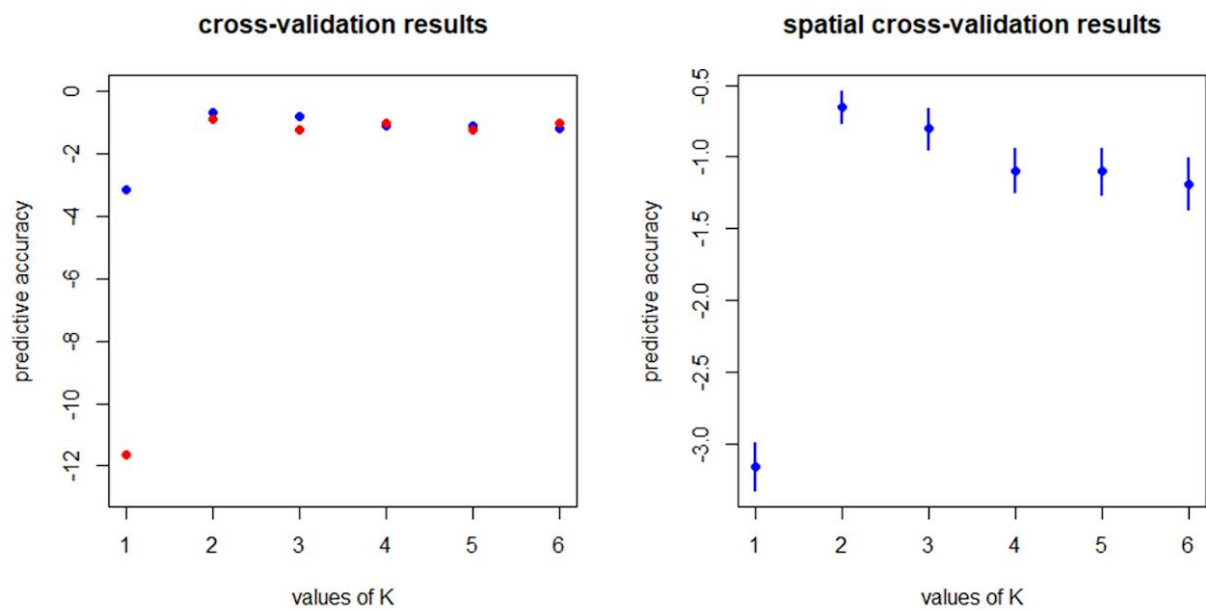


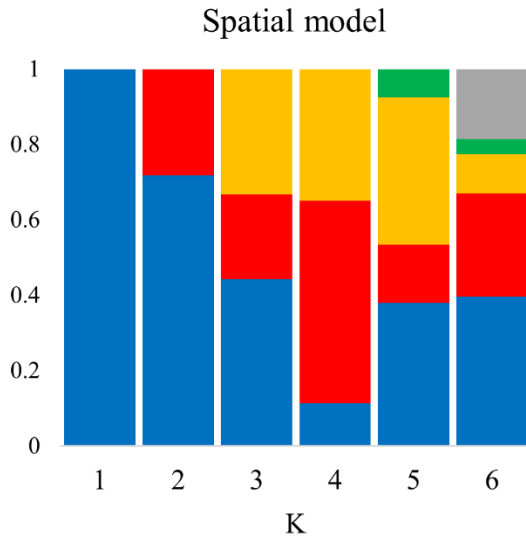
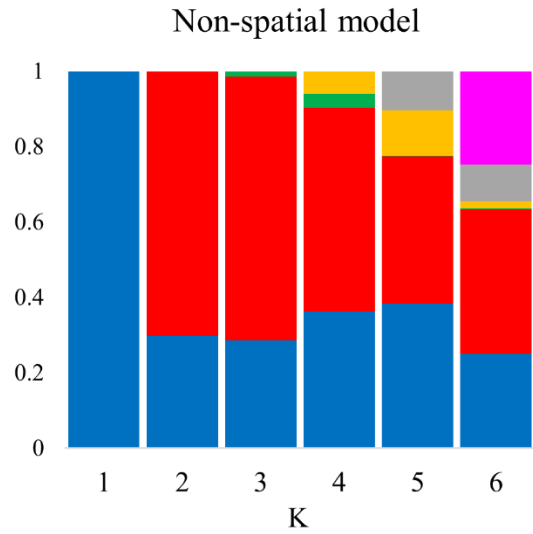
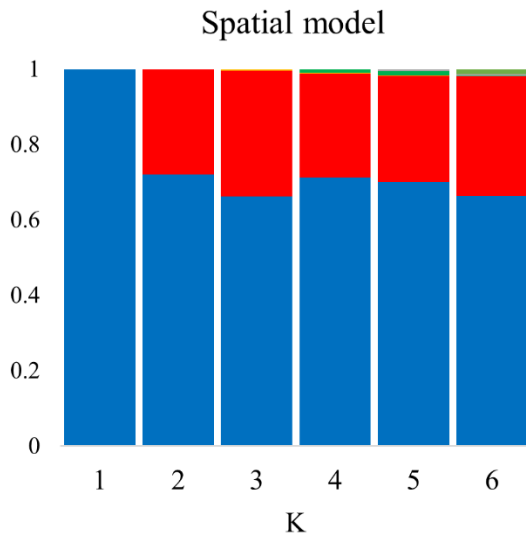
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(a) Lesser Wagtail-tyrant *Stigmatura napensis*(b) White-bellied Spinetail *Mazaria propinqua*

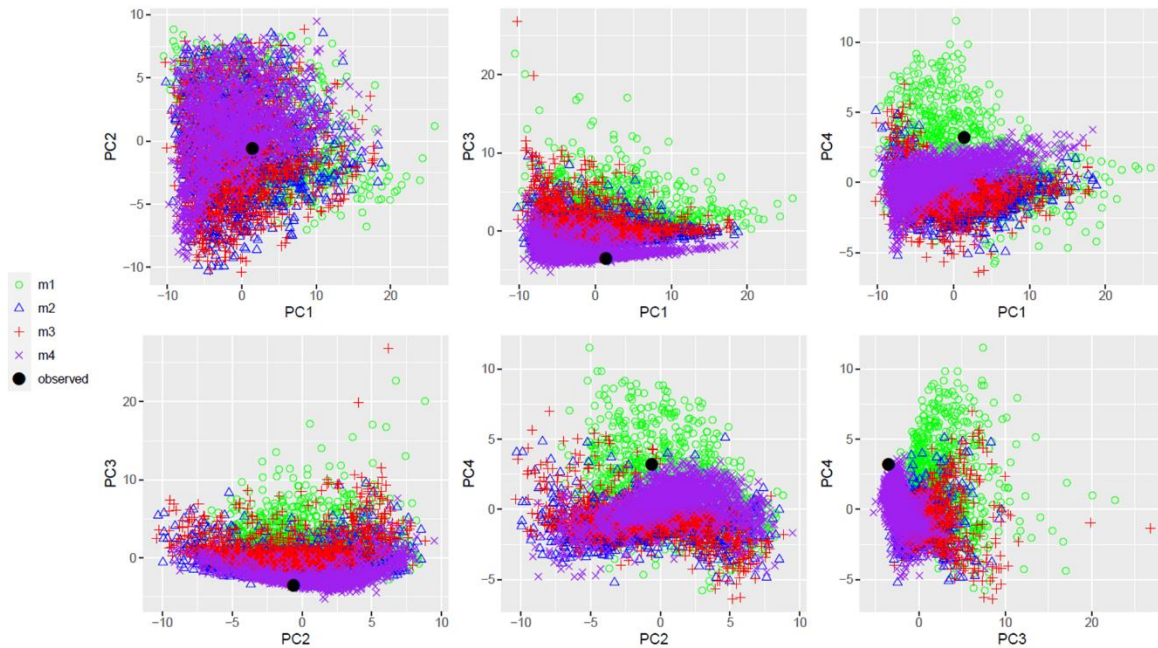
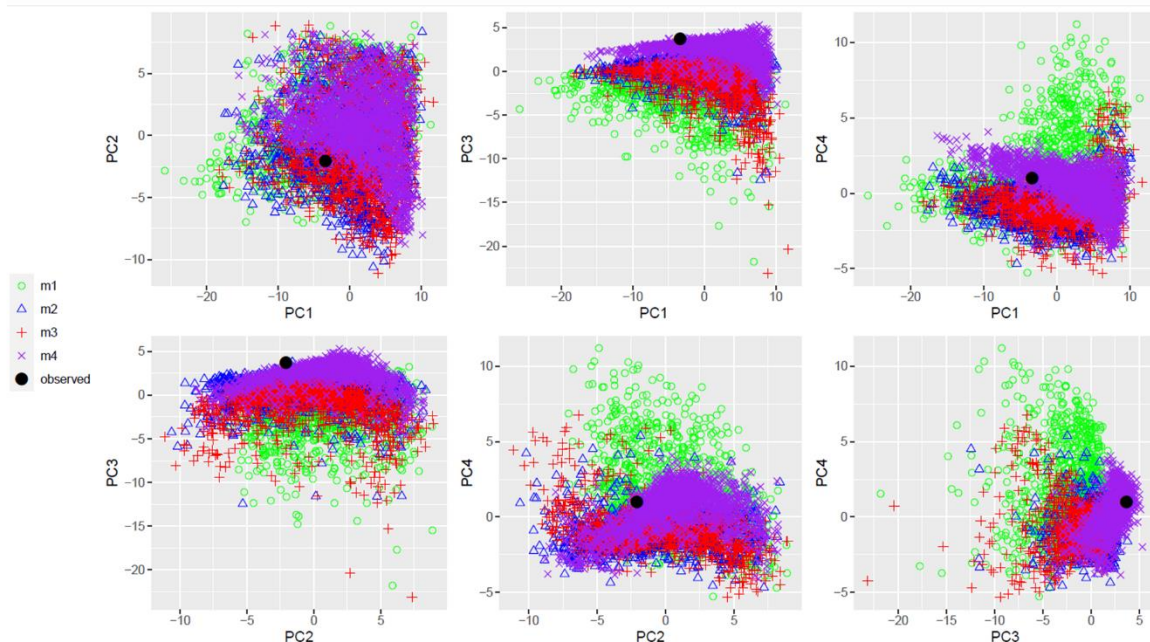
54 **Figure S2.** Cross-validation results comparing spatial (blue) and non-spatial (red) models for one
 55 to six layers for each species tested in the conStruct analysis.

56 (Figure S2 continue...)

(c) Bicolored Conebill *Conirostrum bicolor*

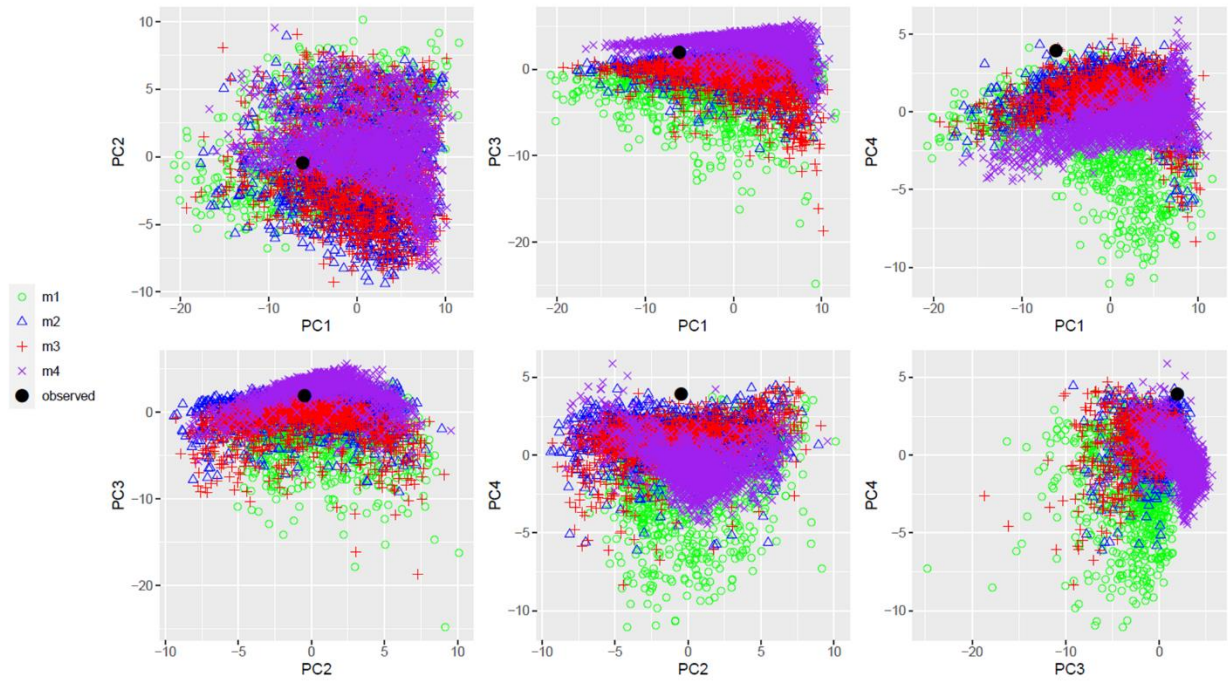
(a) Lesser Wagtail-tyrant *Stigmatura napensis***(b)** White-bellied Spinetail *Mazaria propinqua***(c)** Bicolored Conebill *Conirostrum bicolor*

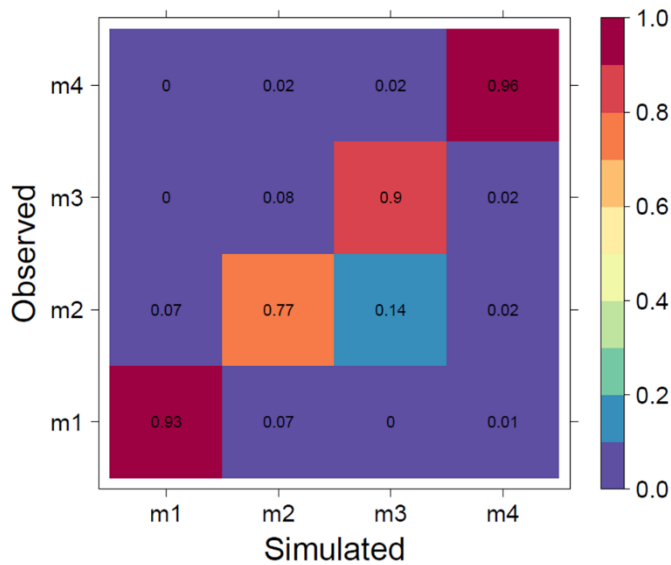
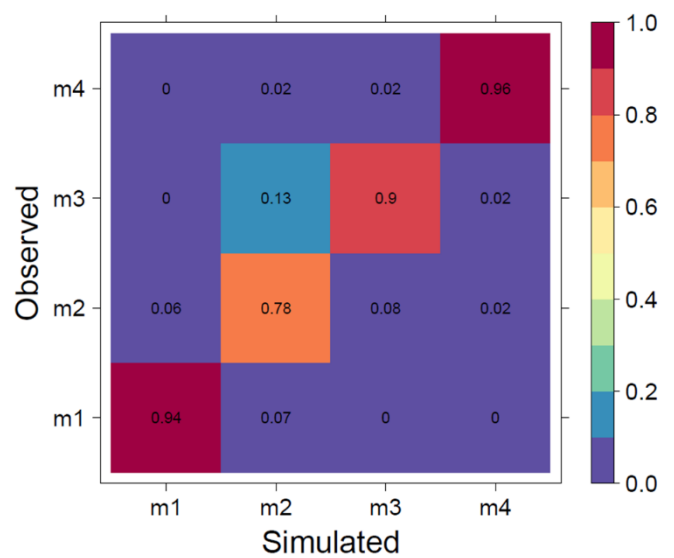
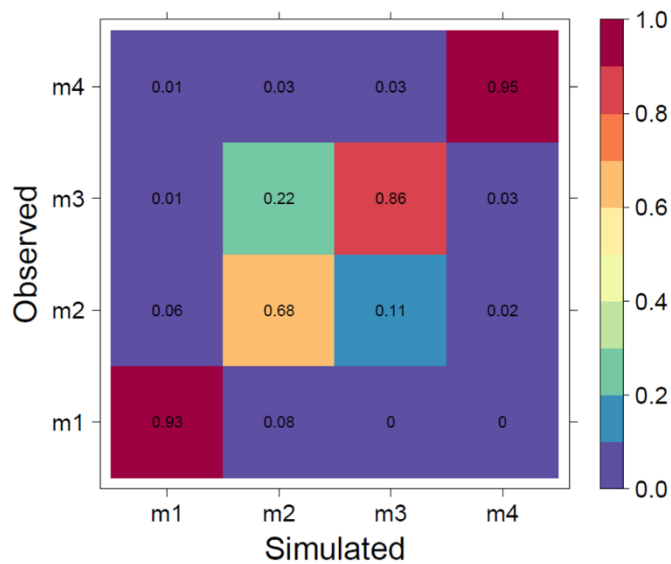
57 **Figure S3.** Cluster contributions for all layers (K= 1 to 6), referring to the spatial model to the
 58 (a) Lesser Wagtail-tyrant *Stigmatura napensis napensis* and (b) Bicolored Conebill *Conirostrum*
 59 *bicolor minus*, and non-spatial model to the (c) White-bellied Spinetail *Mazaria propinqua*
 60 analyzed in conStruct. Covariation contributions smaller than 0.02 were considered spurious.

(a) Lesser Wagtail-tyrante *Stigmatura napensis*(b) White-bellied Spinetail *Mazaria propinqua*

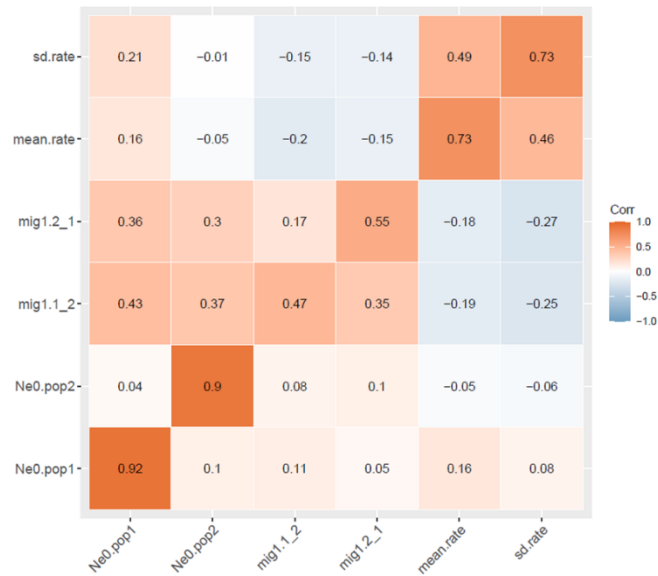
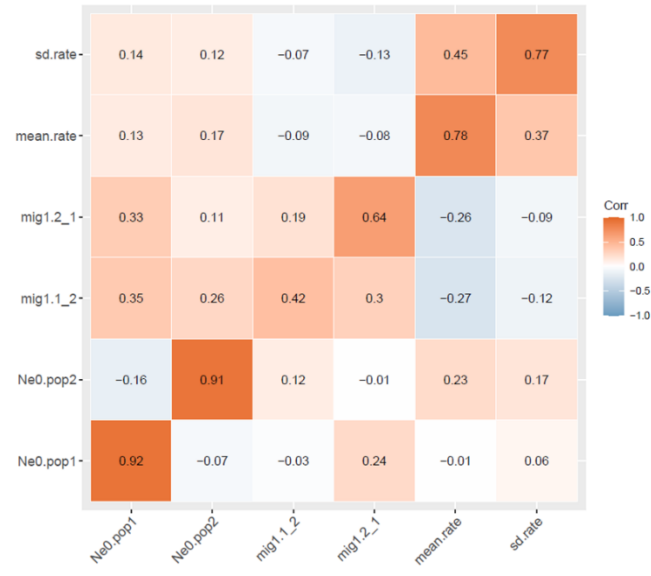
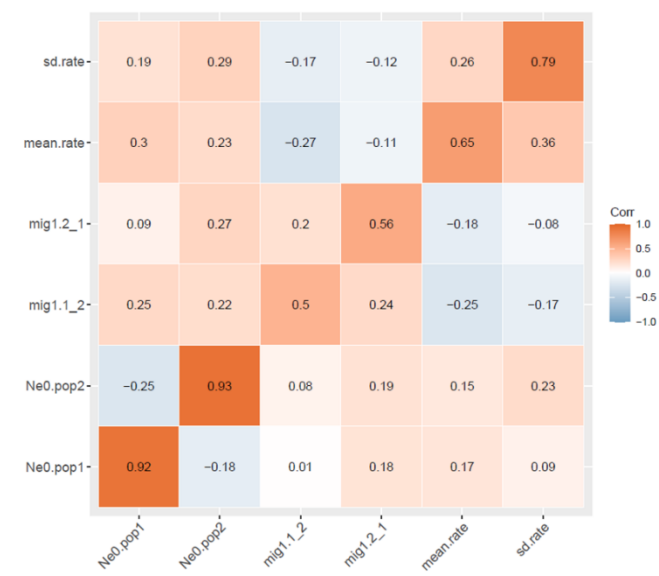
61 **Figure S4.** Analysis of the four principal component axes showing the fit of the simulated
 62 summary statistics of each model (m1 to m4) to the empirical data (dot) for each analyzed
 63 species.

64 (Figure S4 continue...)

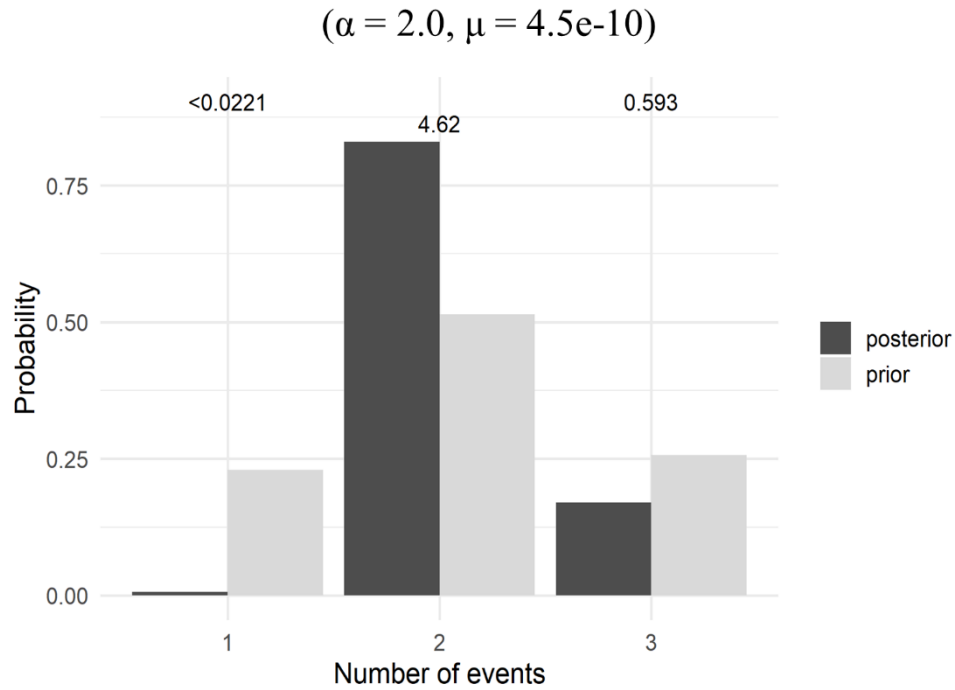
(c) Bicolored Conebill *Conirostrum bicolor*

(a) Lesser Wagtail-tyrant *Stigmatura napensis*(b) White-bellied Spinetail *Mazaria propinqua*(c) Bicolored Conebill *Conirostrum bicolor*

65 **Figure S5.** Confusion matrix indicating the classification accuracy of the models (m1 to m4)
 66 between simulated and observed data.

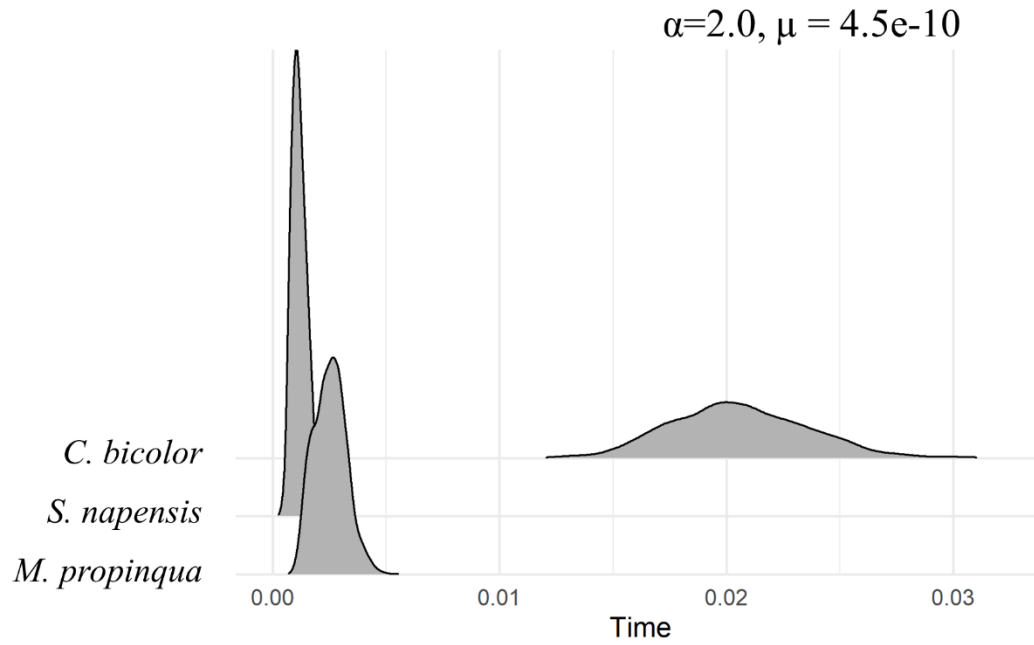
(a) Lesser Wagtail-tyrant *Stigmatura napensis*(b) White-bellied Spinetail *Mazaria propinqua*(c) Bicolored Conebill *Conirostrum bicolor*

67 **Figure S6.** Pearson correlation between simulated and pseudo-observed data obtained from 100 cross-validations of the best model
 68 (Model 3) for the estimated parameters of the current effective population size of the Rio Branco (Ne0.pop1) and Amazonas River and
 69 its tributaries (Ne0.pop2), migration rate (mig1.2_1 and mig1.1_2), mean and standard deviation of mutation rate (mean.rate and
 70 sd.rate, respectively). Parameters with a correlation coefficient > 0.7 were correctly estimated.



71

72 **Figure S7.** Prior (light bars) and posterior (dark bars) distribution probabilities of the number of
 73 divergence events between pairs of populations with concentration parameters of $\alpha = 2$ (sum of
 74 the divergence events divided by two).



75

76 **Figure S8.** Approximate posterior densities of divergence times for each pair of populations with
77 concentration parameters of $\alpha = 2$ (sum of the divergence events divided by two).