

# Supplementary information for Spurgin *et al.* “Spatiotemporal variation in lifelong telomere dynamics in a long-term ecological study”

**Table S1** Model selection table for analysis of factors affecting early life telomere length in juvenile Seychelles warblers. Only models that remained in the top model set for model averaging ( $AICc \leq 6$  compared to the top model) are included here.

Model	df	AICc	Delta AICc	Weight
Sex (males) + Insect abundance + Log age + Tarsus	10	-849.56	0.00	0.12
Sex (males) + Log age + Tarsus	9	-848.26	1.30	0.06
Sex (males) + Group Size + Insect abundance + Log age + Tarsus	11	-848.15	1.40	0.06
Sex (males) + Insect abundance + Log age + Tarsus + Territory quality	11	-847.92	1.63	0.05
Helpers + Sex (males) + Insect abundance + Log age + Tarsus	11	-847.79	1.77	0.05
Sex (males) + Body mass + Insect abundance + Log age + Tarsus	11	-847.71	1.85	0.05
Sex (males) + Density + Insect abundance + Log age + Tarsus	11	-847.60	1.96	0.04
Sex (males) + Group Size + Log age + Tarsus	10	-846.82	2.74	0.03
Sex (males) + Group Size + Insect abundance + Log age + Tarsus + Territory quality	12	-846.60	2.95	0.03
Sex (males) + Log age + Tarsus + Territory quality	10	-846.53	3.03	0.03
Helpers + Sex (males) + Log age + Tarsus	10	-846.50	3.06	0.03
Sex (males) + Body mass + Group Size + Insect abundance + Log age + Tarsus	12	-846.47	3.09	0.02
Sex (males) + Body mass + Log age + Tarsus	10	-846.28	3.28	0.02
Sex (males) + Density + Group Size + Insect abundance + Log age + Tarsus	12	-846.25	3.31	0.02
Sex (males) + Density + Log age + Tarsus	10	-846.25	3.31	0.02
Helpers + Sex (males) + Insect abundance + Log age + Tarsus + Territory quality	12	-846.15	3.41	0.02
Sex (males) + Density + Insect abundance + Log age + Tarsus + Territory quality	12	-846.14	3.42	0.02
Helpers + Sex (males) + Group Size + Insect abundance + Log age + Tarsus	12	-846.12	3.43	0.02
Sex (males) + Body mass + Insect abundance + Log age + Tarsus + Territory quality	12	-846.12	3.44	0.02
Helpers + Sex (males) + Body mass + Insect abundance + Log age + Tarsus	12	-845.98	3.58	0.02
Helpers + Sex (males) + Density + Insect abundance + Log age + Tarsus	12	-845.86	3.70	0.02
Sex (males) + Body mass + Density + Insect abundance + Log age + Tarsus	12	-845.73	3.83	0.02
Sex (males) + Group Size + Log age + Tarsus + Territory quality	11	-845.17	4.39	0.01
Insect abundance + Log age + Tarsus	9	-845.13	4.43	0.01
Sex (males) + Body mass + Group Size + Insect abundance + Log age + Tarsus + Territory quality	13	-845.00	4.56	0.01
Sex (males) + Density + Group Size + Insect abundance + Log age + Tarsus + Territory quality	13	-844.97	4.59	0.01
Sex (males) + Body mass + Group Size + Log age + Tarsus	11	-844.93	4.63	0.01
Sex (males) + Density + Group Size + Log age + Tarsus	11	-844.84	4.72	0.01
Helpers + Sex (males) + Group Size + Log age + Tarsus	11	-844.80	4.76	0.01
Helpers + Sex (males) + Log age + Tarsus + Territory quality	11	-844.77	4.79	0.01
Sex (males) + Density + Log age + Tarsus + Territory quality	11	-844.59	4.97	0.01

Model	df	AICc	Delta AICc	Weight
Helpers + Sex (males) + Group Size + Insect abundance + Log age + Tarsus + Territory quality	13	-844.57	4.99	0.01
Sex (males) + Body mass + Log age + Tarsus + Territory quality	11	-844.56	5.00	0.01
Sex (males) + Body mass + Density + Group Size + Insect abundance + Log age + Tarsus	13	-844.55	5.01	0.01
Helpers + Sex (males) + Body mass + Log age + Tarsus	11	-844.54	5.02	0.01
Helpers + Sex (males) + Density + Log age + Tarsus	11	-844.50	5.06	0.01
Helpers + Sex (males) + Body mass + Group Size + Insect abundance + Log age + Tarsus	13	-844.43	5.12	0.01
Log age + Tarsus	8	-844.42	5.14	0.01
Helpers + Sex (males) + Density + Insect abundance + Log age + Tarsus + Territory quality	13	-844.41	5.15	0.01
Helpers + Sex (males) + Body mass + Insect abundance + Log age + Tarsus + Territory quality	13	-844.39	5.17	0.01
Sex (males) + Body mass + Density + Insect abundance + Log age + Tarsus + Territory quality	13	-844.30	5.25	0.01
Sex (males) + Body mass + Density + Log age + Tarsus	11	-844.26	5.30	0.01
Body mass + Insect abundance + Log age + Tarsus	10	-844.25	5.30	0.01
Helpers + Sex (males) + Density + Group Size + Insect abundance + Log age + Tarsus	13	-844.22	5.33	0.01
Helpers + Sex (males) + Body mass + Density + Insect abundance + Log age + Tarsus	13	-844.03	5.53	0.01
Insect abundance + Log age + Tarsus + Territory quality	10	-843.68	5.87	0.01
Group Size + Insect abundance + Log age + Tarsus	10	-843.56	6.00	0.01

**Table S2** Full model of factors affecting  $\Delta\text{RTL}$  in Seychelles warblers, using longitudinal data.

Variable	Estimate	LCI	UCI
(Intercept)	-0.037	-0.058	-0.016
Age	0.032	-0.012	0.076
Tarsus length	0.047	-0.012	0.106
Number helpers	0.021	-0.037	0.078
Group size	-0.018	-0.072	0.036
Sex (males)	-0.032	-0.090	0.026
Body mass	0.009	-0.044	0.062
Insect abundance	-0.021	-0.066	0.024
Density	-0.042	-0.091	0.008
Territory quality	0.003	-0.045	0.052

**Table S3** Model selection table for analysis of factors affecting  $\Delta$ RTL in Seychelles warblers, using longitudinal data. Only models that remained in the top model set for model averaging ( $AICc \leq 6$  compared to the top model) are included here. TQ = territory quality.

Model	df	AICc	Delta AICc	Weight
Density + Log age	5	10.32	0.00	0.03
Density + Log age + Tarsus	6	10.53	0.21	0.03
Density + Tarsus	5	11.63	1.31	0.02
Body mass + Density + Log age	6	11.69	1.37	0.02
Sex (males) + Density + Log age + Tarsus	7	11.75	1.43	0.02
Density + Insect abundance + Log age + Tarsus	7	11.88	1.56	0.02
Density + Insect abundance + Log age	6	11.93	1.61	0.02
Log age + Tarsus	5	12.02	1.70	0.01
Log age	4	12.03	1.71	0.01
Helpers + Density + Log age	6	12.20	1.88	0.01
Density + Group size + Log age	6	12.29	1.97	0.01
Sex (males) + Density + Log age	6	12.33	2.01	0.01
Density + Log age + Territory quality	6	12.35	2.03	0.01
Sex (males) + Density + Tarsus	6	12.43	2.11	0.01
Density	4	12.44	2.12	0.01
Helpers + Density + Log age + Tarsus	7	12.49	2.17	0.01
Density + Group size + Log age + Tarsus	7	12.52	2.20	0.01
Body mass + Density + Log age + Tarsus	7	12.57	2.24	0.01
Density + Log age + Tarsus + Territory quality	7	12.59	2.26	0.01
Density + Insect abundance + Tarsus	6	12.78	2.46	0.01
Log age + Territory quality	5	12.92	2.60	0.01
Sex (males) + Density + Insect abundance + Log age + Tarsus	8	13.04	2.72	0.01
Sex (males) + Log age + Tarsus	6	13.07	2.75	0.01
Body mass + Density	5	13.08	2.76	0.01
Log age + Tarsus + Territory quality	6	13.14	2.82	0.01
Tarsus	4	13.28	2.96	0.01
Body mass + Density + Insect abundance + Log age	7	13.29	2.96	0.01
Density + Group size + Tarsus	6	13.45	3.13	0.01
Body mass + Log age	5	13.46	3.14	0.01
Sex (males) + Density + Insect abundance + Tarsus	7	13.52	3.20	0.01
Helpers + Body mass + Density + Log age	7	13.54	3.21	0.01
Body mass + Density + Tarsus	6	13.56	3.24	0.01
Helpers + Density + Tarsus	6	13.60	3.28	0.01
Sex (males) + Body mass + Density + Log age + Tarsus	8	13.61	3.28	0.01
Sex (males) + Body mass + Density + Log age	7	13.65	3.33	0.01

Model	df	AICc	Delta AICc	Weight
Density + Tarsus + Territory quality	6	13.67	3.35	0.01
Sex (males) + Density + Group size + Log age + Tarsus	8	13.69	3.37	0.01
Helpers + Sex (males) + Density + Log age + Tarsus	8	13.72	3.39	0.01
Body mass + Density + Log age + Territory quality	7	13.73	3.41	0.01
Body mass + Density + Group size + Log age	7	13.73	3.41	0.01
Group size + Log age	5	13.78	3.45	0.01
Helpers + Density + Insect abundance + Log age	7	13.79	3.47	0.01
Group size + Log age + Tarsus	6	13.80	3.48	0.01
Sex (males) + Density + Log age + Tarsus + Territory quality	8	13.81	3.49	0.01
Helpers + Density + Insect abundance + Log age + Tarsus	8	13.82	3.50	0.01
Helpers + Density + Group size + Log age	7	13.85	3.52	0.01
Sex (males) + Tarsus	5	13.86	3.54	0.01
Density + Group size + Insect abundance + Log age + Tarsus	8	13.87	3.54	0.01
Density + Group size + Insect abundance + Log age	7	13.90	3.58	0.01
Helpers + Log age	5	13.91	3.59	0.01
Density + Insect abundance + Log age + Tarsus + Territory quality	8	13.92	3.60	0.01
Body mass + Density + Insect abundance + Log age + Tarsus	8	13.93	3.61	0.01
Density + Insect abundance	5	13.93	3.61	0.01
Sex (males) + Density + Insect abundance + Log age	7	13.94	3.62	0.01
Density + Insect abundance + Log age + Territory quality	7	13.94	3.62	0.01
Helpers + Log age + Tarsus	6	13.98	3.65	0.01
Sex (males) + Body mass + Density + Tarsus	7	14.00	3.68	0.01
Insect abundance + Log age + Tarsus	6	14.00	3.68	0.01
Sex (males) + Log age	5	14.04	3.72	0.01
Body mass + Log age + Tarsus	6	14.07	3.75	0.01
Insect abundance + Log age	5	14.07	3.75	0.01
Sex (males) + Density + Group size + Tarsus	7	14.17	3.85	0.01
Density + Group size	5	14.20	3.88	0.00
Helpers + Sex (males) + Density + Log age	7	14.23	3.91	0.00
Helpers + Density + Group size + Log age + Tarsus	8	14.24	3.92	0.00
Helpers + Density + Log age + Territory quality	7	14.25	3.92	0.00
Sex (males) + Log age + Tarsus + Territory quality	7	14.29	3.96	0.00
Sex (males) + Density + Group size + Log age	7	14.32	4.00	0.00
Helpers + Density	5	14.32	4.00	0.00
Density + Group size + Log age + Territory quality	7	14.32	4.00	0.00
Body mass + Log age + Territory quality	6	14.36	4.03	0.00
Sex (males) + Density + Log age + Territory quality	7	14.37	4.05	0.00

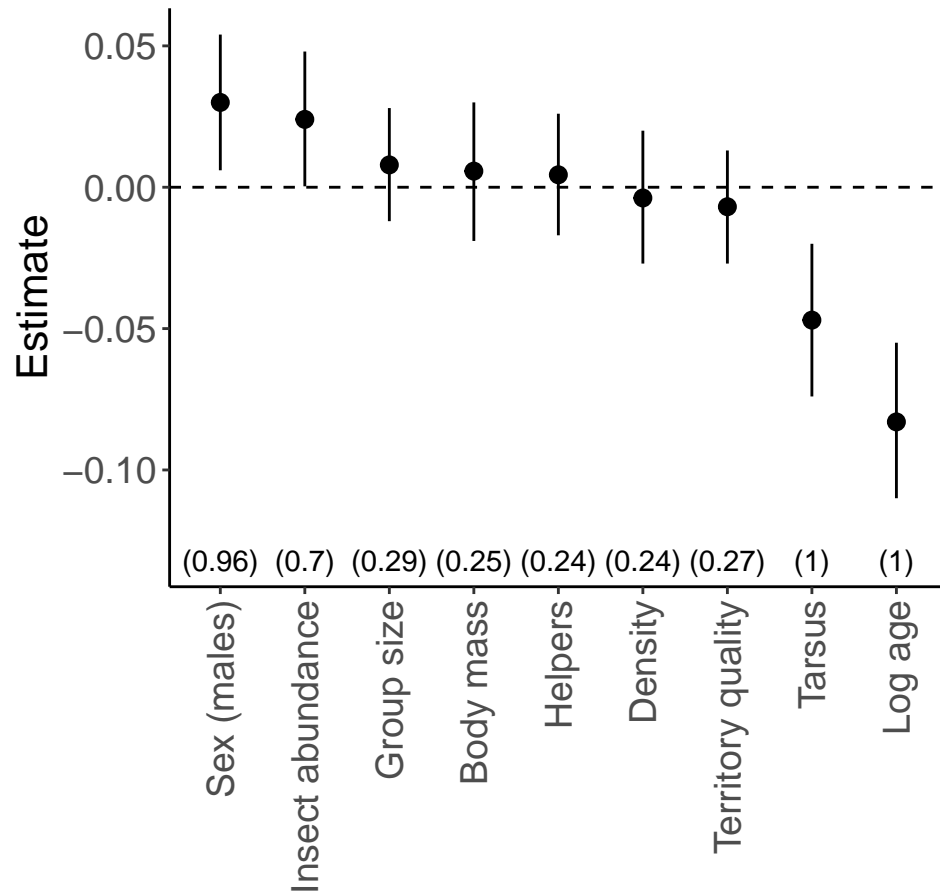
Model	df	AICc	Delta AICc	Weight
Null model	3	14.40	4.08	0.00
Helpers + Sex (males) + Density + Tarsus	7	14.41	4.09	0.00
Sex (males) + Density	5	14.42	4.10	0.00
Sex (males) + Density + Tarsus + Territory quality	7	14.48	4.15	0.00
Density + Territory quality	5	14.48	4.16	0.00
Helpers + Body mass + Density + Log age + Tarsus	8	14.52	4.20	0.00
Helpers + Density + Log age + Tarsus + Territory quality	8	14.55	4.23	0.00
Tarsus + Territory quality	5	14.56	4.24	0.00
Body mass + Density + Insect abundance	6	14.56	4.24	0.00
Body mass + Density + Group size + Log age + Tarsus	8	14.57	4.25	0.00
Density + Group size + Log age + Tarsus + Territory quality	8	14.58	4.26	0.00
Density + Group size + Insect abundance + Tarsus	7	14.60	4.28	0.00
Body mass + Density + Log age + Tarsus + Territory quality	8	14.63	4.31	0.00
Group size + Log age + Territory quality	6	14.70	4.38	0.00
Helpers + Density + Insect abundance + Tarsus	7	14.73	4.41	0.00
Sex (males) + Group size + Log age + Tarsus	7	14.75	4.43	0.00
Body mass + Density + Insect abundance + Tarsus	7	14.76	4.43	0.00
Group size + Tarsus	5	14.77	4.45	0.00
Density + Insect abundance + Tarsus + Territory quality	7	14.84	4.51	0.00
Helpers + Log age + Territory quality	6	14.85	4.53	0.00
Insect abundance + Log age + Territory quality	6	14.85	4.53	0.00
Helpers + Body mass + Density	6	14.91	4.59	0.00
Sex (males) + Body mass + Density	6	14.91	4.59	0.00
Insect abundance + Log age + Tarsus + Territory quality	7	14.93	4.61	0.00
Sex (males) + Body mass + Density + Insect abundance + Log age + Tarsus	9	14.94	4.62	0.00
Group size + Log age + Tarsus + Territory quality	7	14.94	4.62	0.00
Sex (males) + Log age + Territory quality	6	14.95	4.63	0.00
Sex (males) + Density + Group size + Insect abundance + Log age + Tarsus	9	14.97	4.65	0.00
Sex (males) + Body mass + Log age + Tarsus	7	14.98	4.65	0.00
Helpers + Sex (males) + Density + Insect abundance + Log age + Tarsus	9	14.99	4.67	0.00
Helpers + Group size + Log age	6	15.02	4.70	0.00
Sex (males) + Insect abundance + Log age + Tarsus	7	15.02	4.70	0.00
Helpers + Density + Group size + Tarsus	7	15.02	4.70	0.00
Helpers + Sex (males) + Log age + Tarsus	7	15.03	4.71	0.00
Body mass + Density + Group size	6	15.05	4.73	0.00
Sex (males) + Density + Insect abundance + Log age + Tarsus + Territory quality	9	15.10	4.77	0.00
Body mass	4	15.11	4.79	0.00

Model	df	AICc	Delta AICc	Weight
Helpers + Body mass + Density + Insect abundance + Log age	8	15.11	4.79	0.00
Helpers + Log age + Tarsus + Territory quality	7	15.12	4.80	0.00
Body mass + Density + Territory quality	6	15.13	4.80	0.00
Sex (males) + Body mass + Density + Insect abundance + Tarsus	8	15.16	4.84	0.00
Body mass + Log age + Tarsus + Territory quality	7	15.18	4.86	0.00
Insect abundance + Tarsus	5	15.19	4.87	0.00
Sex (males) + Group size + Tarsus	6	15.23	4.91	0.00
Sex (males) + Tarsus + Territory quality	6	15.24	4.92	0.00
Helpers + Tarsus	5	15.24	4.92	0.00
Sex (males) + Density + Group size + Insect abundance + Tarsus	8	15.25	4.93	0.00
Body mass + Tarsus	5	15.26	4.94	0.00
Sex (males) + Body mass + Density + Insect abundance + Log age	8	15.28	4.96	0.00
Helpers + Group size + Log age + Tarsus	7	15.28	4.96	0.00
Helpers + Body mass + Log age	6	15.30	4.98	0.00
Body mass + Density + Insect abundance + Log age + Territory quality	8	15.30	4.98	0.00
Body mass + Density + Group size + Insect abundance + Log age	8	15.33	5.01	0.00
Helpers + Sex (males) + Density + Group size + Log age + Tarsus	9	15.35	5.03	0.00
Body mass + Group size + Log age	6	15.35	5.03	0.00
Helpers + Body mass + Density + Group size + Log age	8	15.37	5.05	0.00
Helpers + Density + Group size + Insect abundance + Log age	8	15.39	5.07	0.00
Sex (males) + Body mass + Log age	6	15.42	5.10	0.00
Territory quality	4	15.45	5.13	0.00
Body mass + Density + Group size + Tarsus	7	15.45	5.13	0.00
Helpers + Sex (males) + Density + Insect abundance + Tarsus	8	15.48	5.15	0.00
Helpers + Sex (males) + Body mass + Density + Log age	8	15.48	5.16	0.00
Helpers + Density + Group size	6	15.49	5.16	0.00
Body mass + Insect abundance + Log age	6	15.50	5.18	0.00
Density + Group size + Tarsus + Territory quality	7	15.51	5.18	0.00
Sex (males) + Body mass + Tarsus	6	15.51	5.19	0.00
Helpers + Body mass + Density + Tarsus	7	15.51	5.19	0.00
Helpers + Density + Group size + Insect abundance + Log age + Tarsus	9	15.53	5.21	0.00
Helpers + Sex (males) + Body mass + Density + Log age + Tarsus	9	15.54	5.22	0.00
Sex (males) + Density + Insect abundance + Tarsus + Territory quality	8	15.58	5.26	0.00
Helpers + Body mass + Density + Log age + Territory quality	8	15.59	5.27	0.00
Sex (males) + Body mass + Density + Group size + Log age + Tarsus	9	15.61	5.29	0.00
Body mass + Density + Tarsus + Territory quality	7	15.61	5.29	0.00
Helpers + Density + Tarsus + Territory quality	7	15.64	5.32	0.00

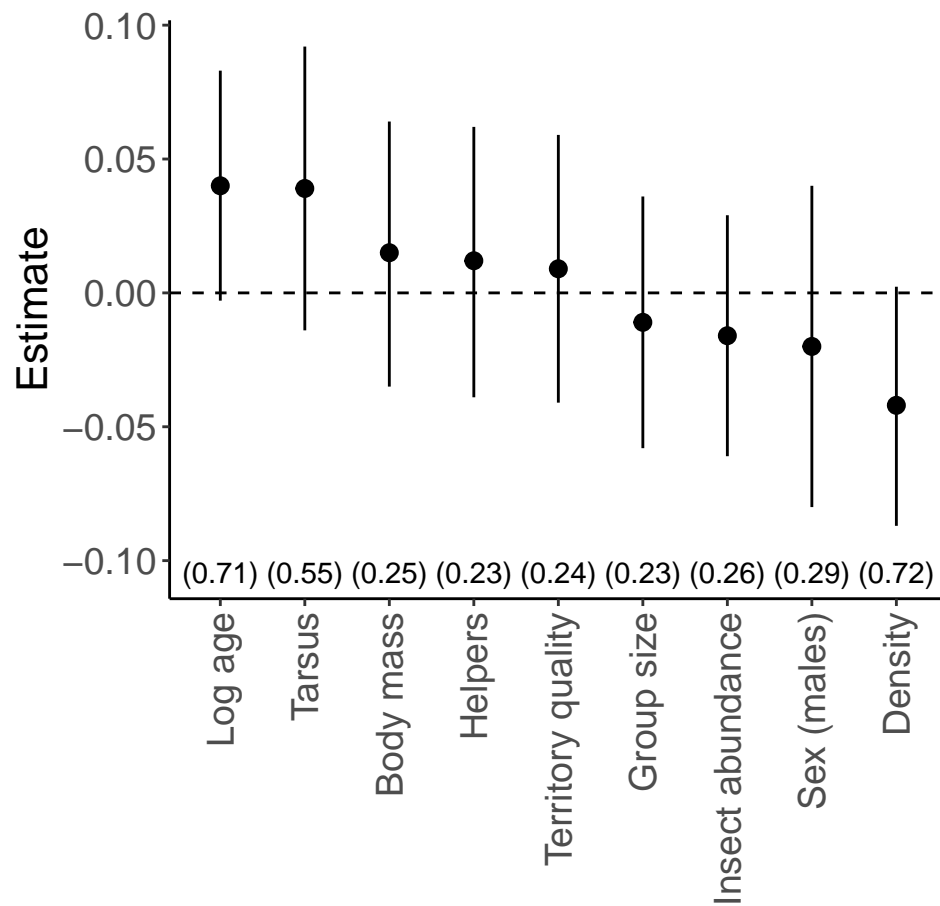
Model	df	AICc	Delta AICc	Weight
Helpers + Sex (males) + Density + Group size + Tarsus	8	15.65	5.33	0.00
Sex (males) + Body mass + Density + Log age + Tarsus + Territory quality	9	15.68	5.35	0.00
Density + Group size + Insect abundance	6	15.69	5.37	0.00
Sex (males) + Body mass + Density + Log age + Territory quality	8	15.70	5.38	0.00
Sex (males) + Body mass + Density + Group size + Log age	8	15.70	5.38	0.00
Sex (males) + Insect abundance + Tarsus	6	15.74	5.42	0.00
Sex (males) + Density + Group size + Log age + Tarsus + Territory quality	9	15.76	5.44	0.00
Group size + Insect abundance + Log age + Tarsus	7	15.77	5.45	0.00
Body mass + Density + Group size + Log age + Territory quality	8	15.78	5.45	0.00
Group size	4	15.78	5.46	0.00
Helpers + Sex (males) + Density + Log age + Tarsus + Territory quality	9	15.79	5.47	0.00
Helpers + Density + Insect abundance	6	15.79	5.47	0.00
Sex (males) + Group size + Log age	6	15.81	5.48	0.00
Group size + Insect abundance + Log age	6	15.81	5.49	0.00
Helpers + Sex (males) + Density + Insect abundance + Log age	8	15.82	5.49	0.00
Helpers + Density + Insect abundance + Log age + Territory quality	8	15.82	5.50	0.00
Helpers + Sex (males) + Tarsus	6	15.83	5.51	0.00
Body mass + Group size + Log age + Tarsus	7	15.85	5.53	0.00
Helpers + Body mass + Density + Insect abundance + Log age + Tarsus	9	15.87	5.55	0.00
Helpers + Density + Insect abundance + Log age + Tarsus + Territory quality	9	15.88	5.56	0.00
Sex (males) + Body mass + Density + Group size + Tarsus	8	15.89	5.57	0.00
Helpers + Density + Group size + Log age + Territory quality	8	15.89	5.57	0.00
Helpers + Sex (males) + Density + Group size + Log age	8	15.90	5.58	0.00
Sex (males) + Density + Insect abundance	6	15.91	5.58	0.00
Density + Group size + Insect abundance + Log age + Territory quality	8	15.91	5.59	0.00
Density + Group size + Insect abundance + Log age + Tarsus + Territory quality	9	15.91	5.59	0.00
Sex (males) + Density + Group size + Insect abundance + Log age	8	15.93	5.60	0.00
Helpers + Sex (males) + Body mass + Density + Tarsus	8	15.93	5.61	0.00
Helpers + Sex (males) + Log age	6	15.93	5.61	0.00
Body mass + Density + Group size + Insect abundance + Log age + Tarsus	9	15.94	5.61	0.00
Helpers + Insect abundance + Log age	6	15.95	5.62	0.00
Helpers + Insect abundance + Log age + Tarsus	7	15.95	5.63	0.00
Sex (males) + Density + Insect abundance + Log age + Territory quality	8	15.96	5.63	0.00
Density + Insect abundance + Territory quality	6	15.97	5.65	0.00
Body mass + Density + Insect abundance + Log age + Tarsus + Territory quality	9	15.98	5.66	0.00
Sex (males) + Group size + Log age + Tarsus + Territory quality	8	16.00	5.68	0.00
Helpers + Body mass + Log age + Tarsus	7	16.02	5.70	0.00



Model	df	AICc	Delta AICc	Weight
Sex (males) + Insect abundance + Log age + Tarsus + Territory quality	8	16.04	5.72	0.00
Body mass + Insect abundance + Log age + Tarsus	7	16.06	5.73	0.00
Sex (males) + Body mass + Density + Tarsus + Territory quality	8	16.06	5.73	0.00
Helpers + Group size + Tarsus	6	16.06	5.74	0.00
Group size + Tarsus + Territory quality	6	16.08	5.76	0.00
Sex (males) + Insect abundance + Log age	6	16.09	5.76	0.00
Helpers + Group size + Log age + Territory quality	7	16.09	5.77	0.00
Helpers + Density + Group size + Insect abundance + Tarsus	8	16.10	5.78	0.00
Body mass + Territory quality	5	16.14	5.82	0.00
Helpers + Sex (males) + Group size + Log age + Tarsus	8	16.15	5.82	0.00
Sex (males) + Body mass + Log age + Tarsus + Territory quality	8	16.17	5.85	0.00
Sex (males) + Density + Group size	6	16.21	5.89	0.00
Sex (males) + Density + Group size + Tarsus + Territory quality	8	16.23	5.91	0.00
Density + Group size + Territory quality	6	16.24	5.92	0.00
Helpers + Body mass + Log age + Territory quality	7	16.25	5.93	0.00
Insect abundance + Tarsus + Territory quality	6	16.26	5.94	0.00
Body mass + Group size + Log age + Territory quality	7	16.27	5.95	0.00
Helpers	4	16.27	5.95	0.00
Helpers + Sex (males) + Log age + Tarsus + Territory quality	8	16.28	5.96	0.00
Helpers + Sex (males) + Density + Log age + Territory quality	8	16.28	5.96	0.00
Body mass + Insect abundance + Log age + Territory quality	7	16.28	5.96	0.00
Helpers + Body mass + Density + Group size + Log age + Tarsus	9	16.31	5.99	0.00
Helpers + Density + Group size + Log age + Tarsus + Territory quality	9	16.31	5.99	0.00
Sex (males) + Body mass + Log age + Territory quality	7	16.32	5.99	0.00
Helpers + Sex (males) + Density	6	16.32	6.00	0.00



**Figure S1** Model averaged estimates and 95% confidence intervals for social and ecological environmental variables in relation to RTL in Seychelles warblers.



**Figure S2** Model averaged estimates and 95% confidence intervals for social and ecological environmental variables in relation to  $\Delta$ RTL in Seychelles warblers, using longitudinal data.